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Maeda

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(54) **AIR GUN AND MAGAZINE FOR AIR GUN**

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(73) Assignee: **Maruzen Company Limited**, Tokyo (JP)

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(51) **Int. Cl.**
F41B 11/00 (2006.01)

(52) **U.S. Cl.** **124/74**; 124/75

(58) **Field of Classification Search** 124/31, 124/45, 51.1, 73, 74

See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

2006/0112944	A1	6/2006	Su	
2006/0201491	A1 *	9/2006	Wei	124/74
2006/0207584	A1 *	9/2006	Yeh	124/45

FOREIGN PATENT DOCUMENTS

EP	0 932 013 A2	7/1999
EP	1 939 576 A1	7/2008

OTHER PUBLICATIONS

Extended European Search Report, App. No. EP08 01 7985, Jan. 29, 2009 (8 pages).
Taiwan IPO Search Report issued Jul. 26, 2011 for corresponding Taiwanese Application No. 097117001.
Taiwan IPO Search Report, App. No. 097117001, Date of Completion: Apr. 14, 2011 (1 page).

* cited by examiner

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(57) **ABSTRACT**

According to the present invention, by providing an extremely simple member such as a partition wall having a microscopic hole section, it is possible to reliably reduce the speed of a bullet to within a fixed speed, even a complicated decompression device such as a regulator is not provided. As a result, manufacturing time for the air gun is shortened, it is possible to lower manufacturing cost, and there is the effect of improving the manufacturing efficiency.
This is because with an air gun or a magazine for an air gun of the present invention, by having a structure where the opening area of the microscopic hole section of the partition wall is smaller that the gas discharge path opening when the gas discharge path of the discharge valve is open, the gas volume per unit time that flows into the discharge valve chamber from the gas canister side by means of the microscopic holes section is smaller than the gas volume per unit time that flow out from the discharge valve chamber as a result of opening the gas discharge path of the discharge valve, which means that gas speed and gas pressure from the discharge valve chamber to the chamber where a bullet is positioned is lowered. The firing speed of a bullet is thus reduced.

4 Claims, 21 Drawing Sheets

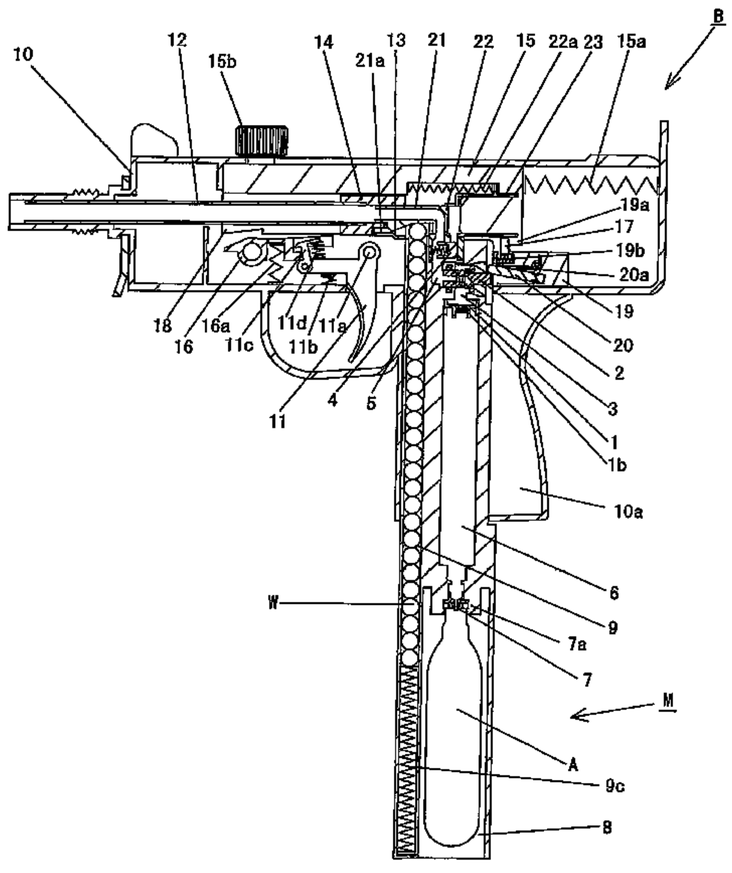

Fig. 1

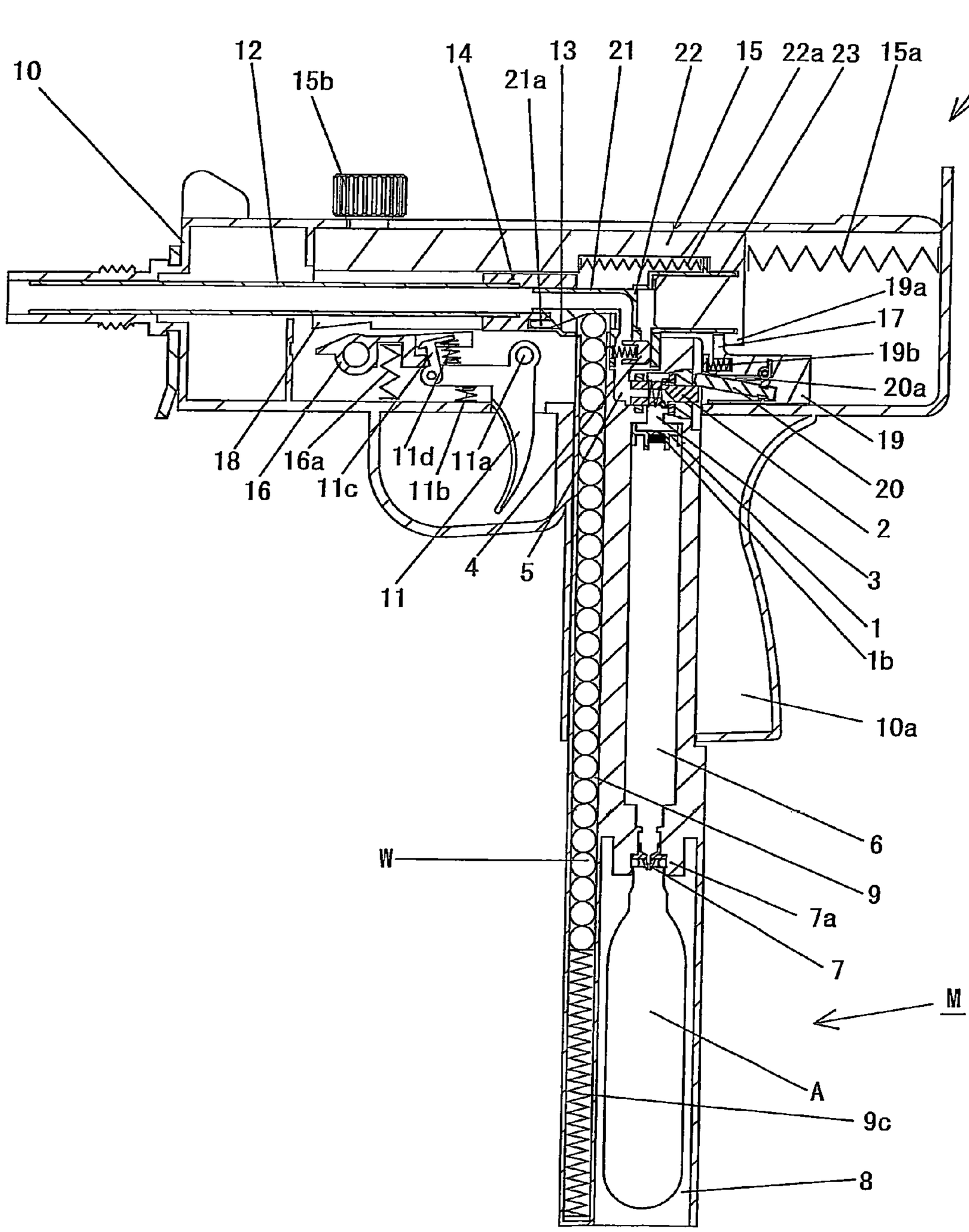
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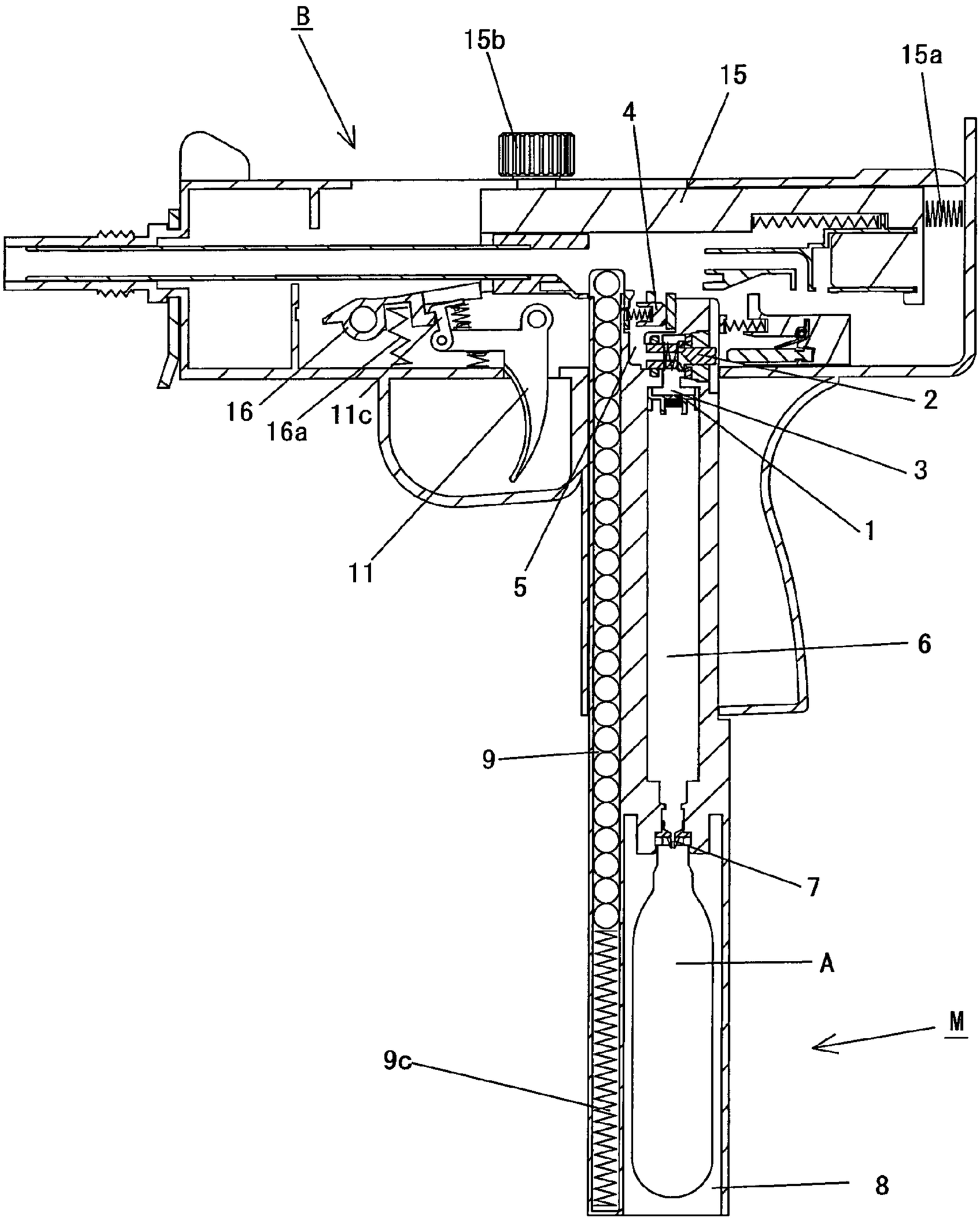
Fig. 2



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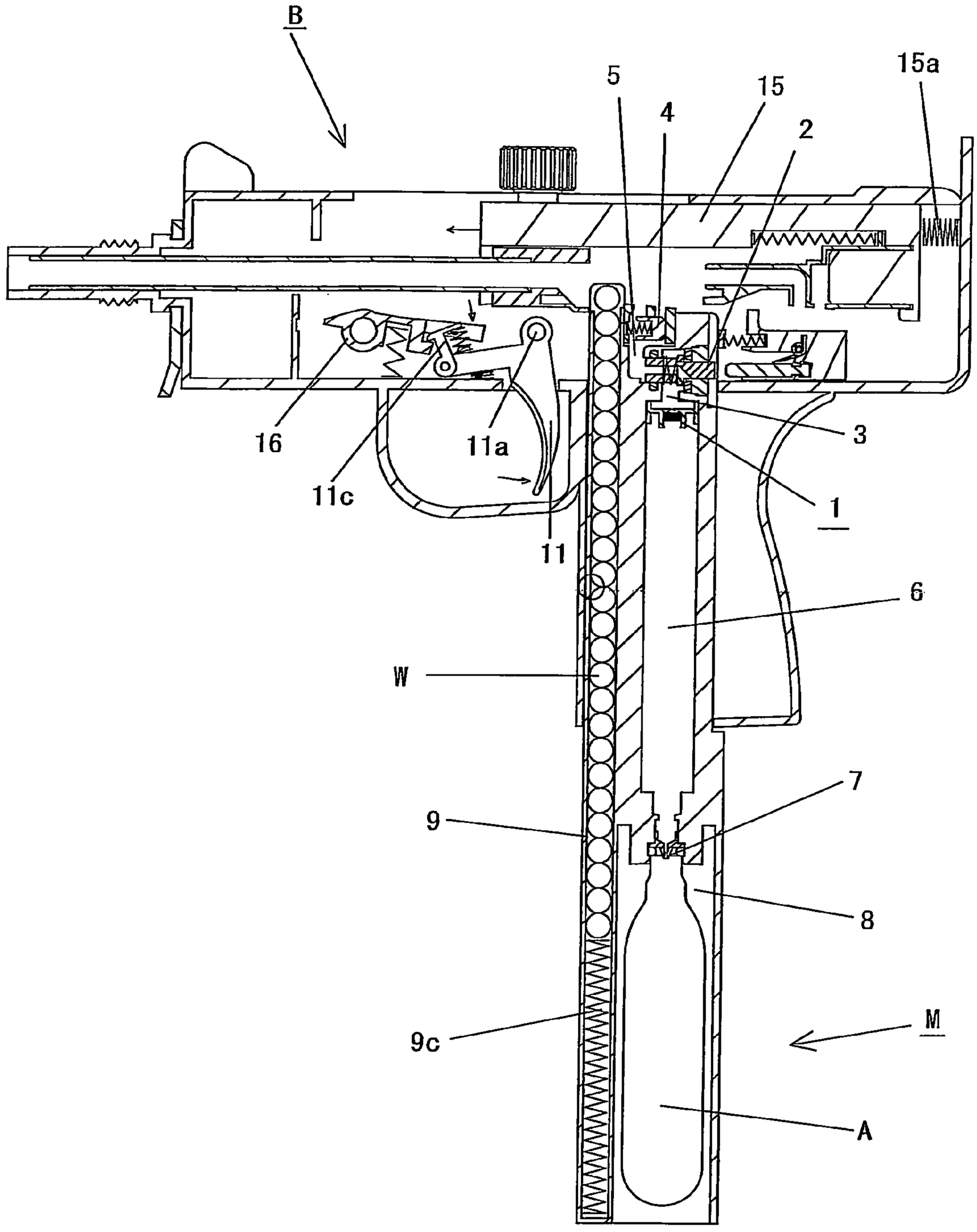
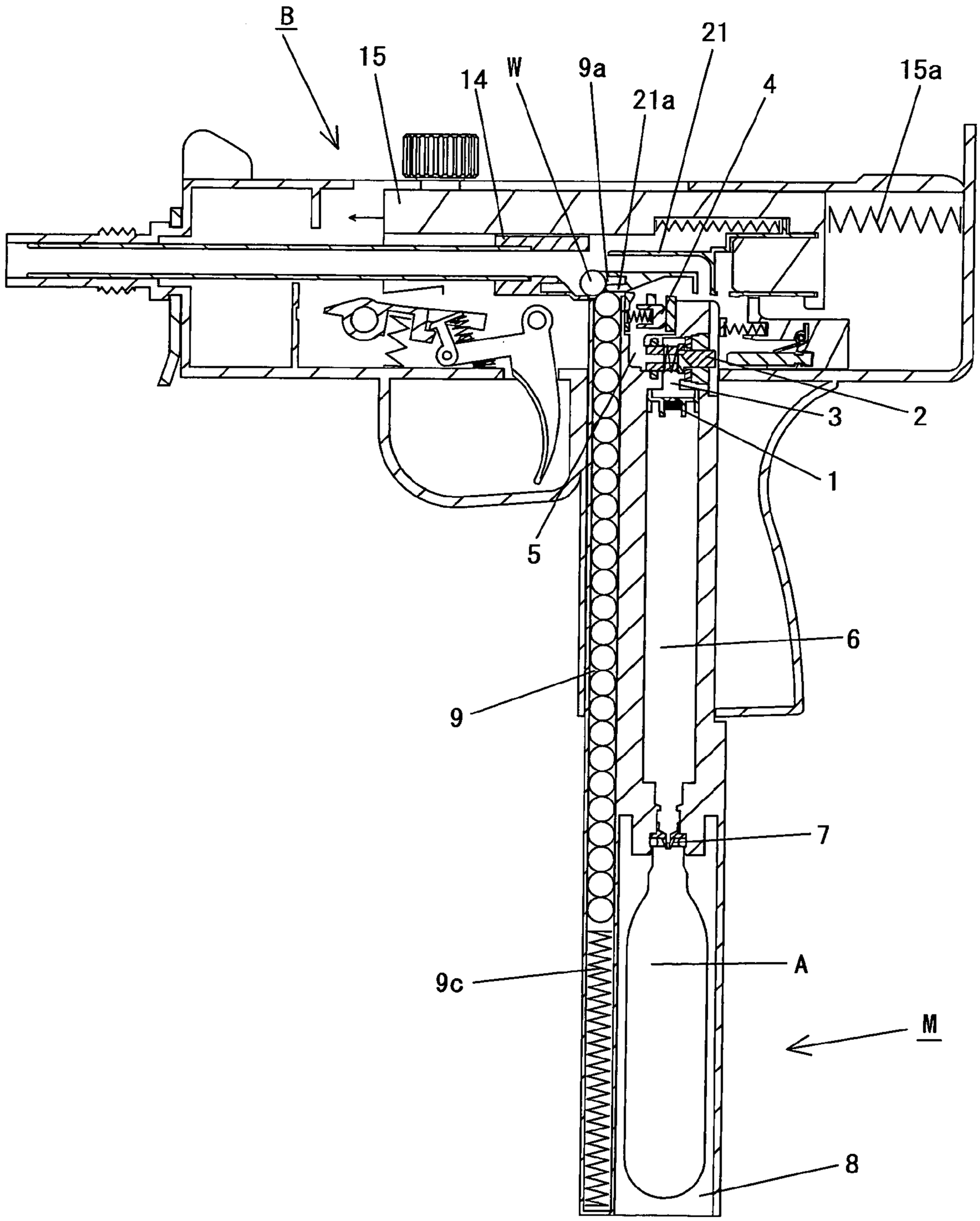


Fig. 4



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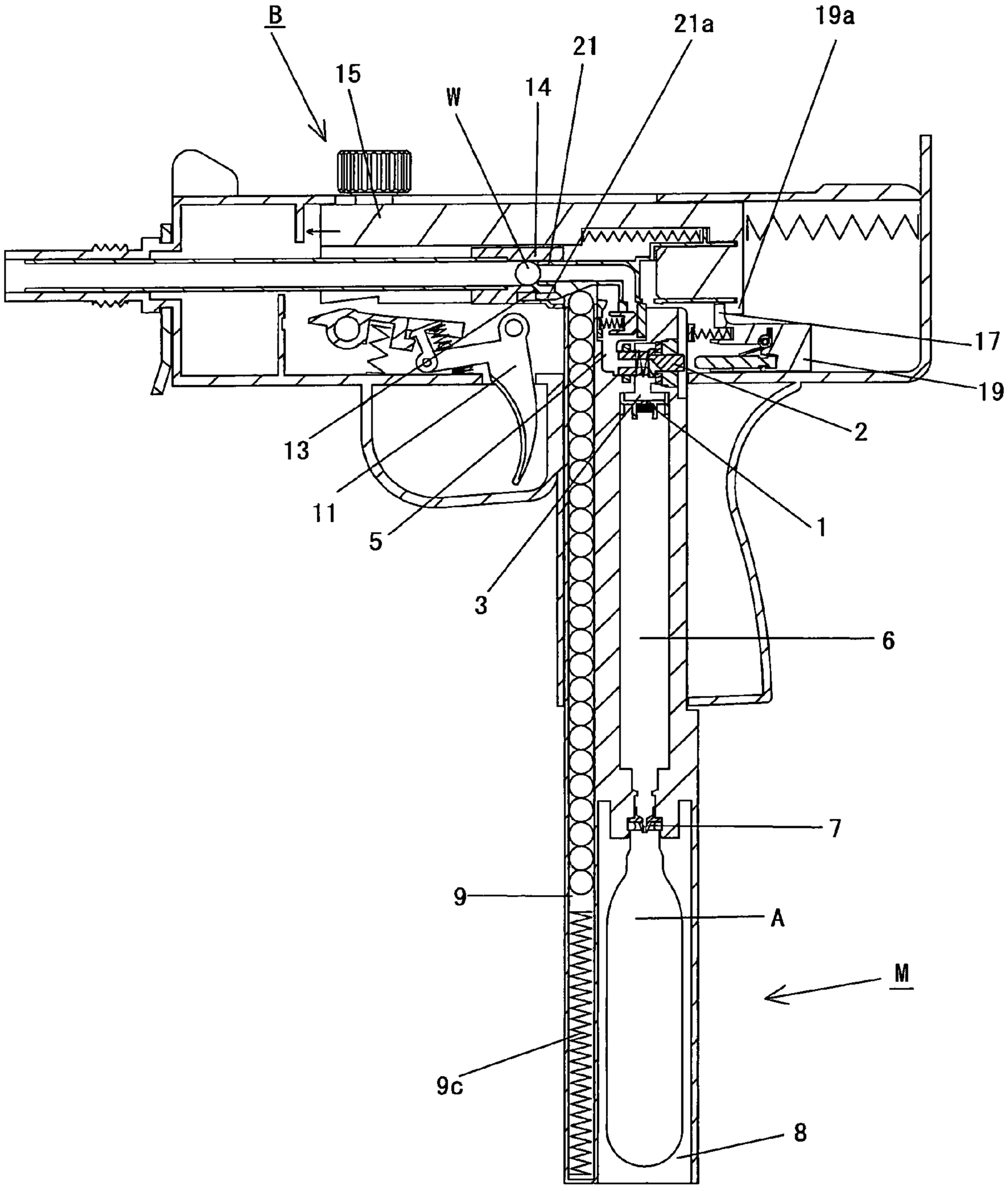

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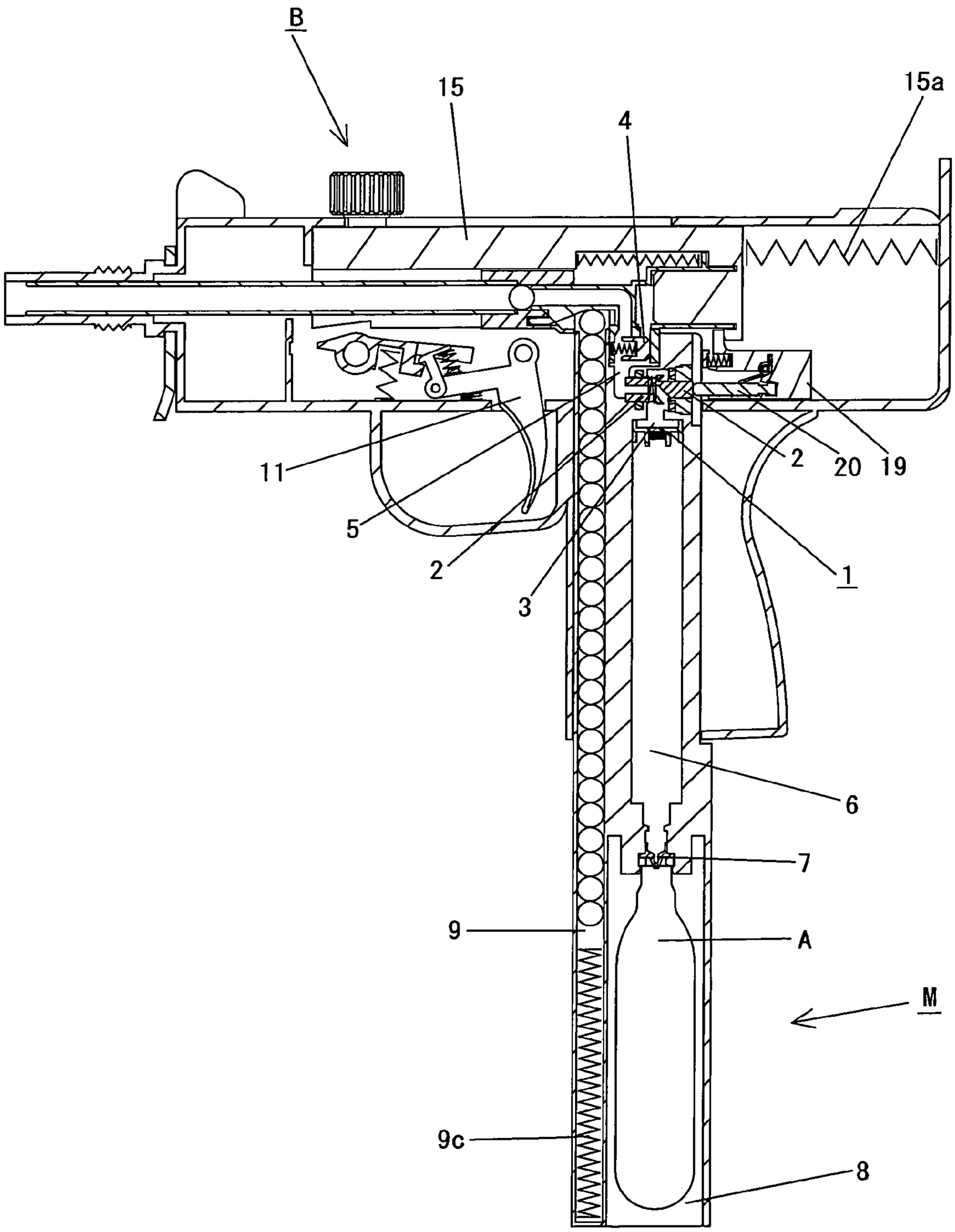

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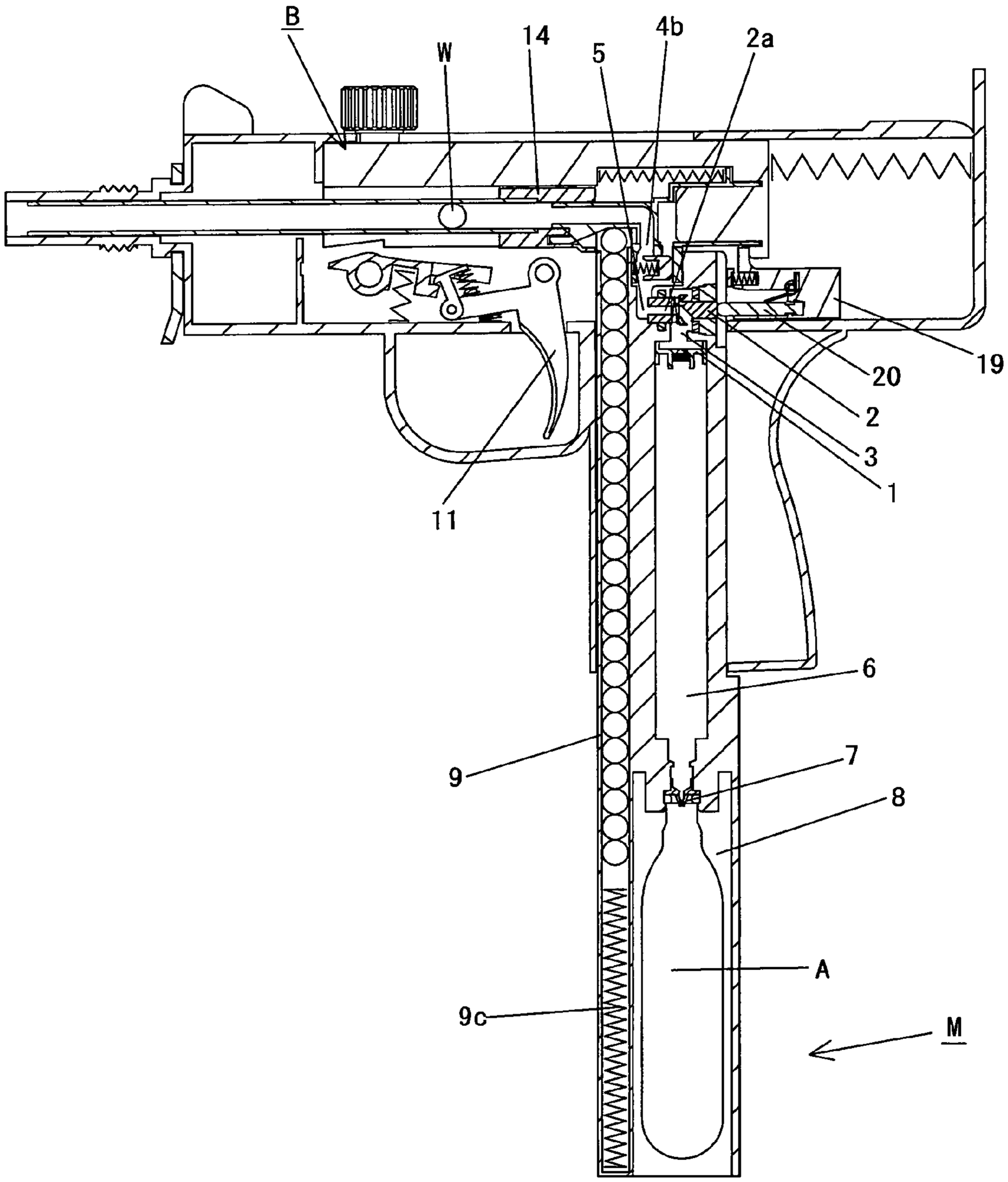

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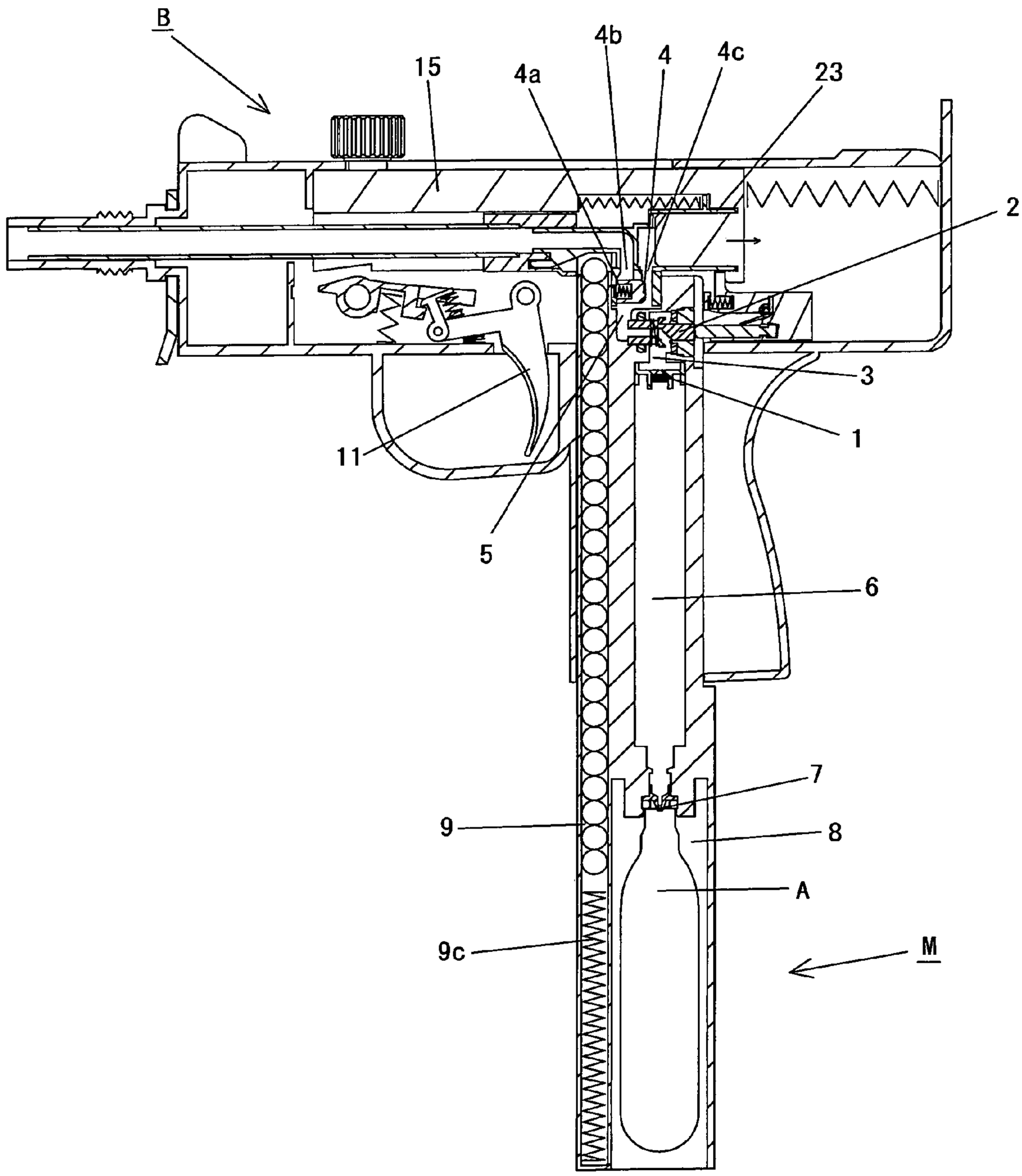

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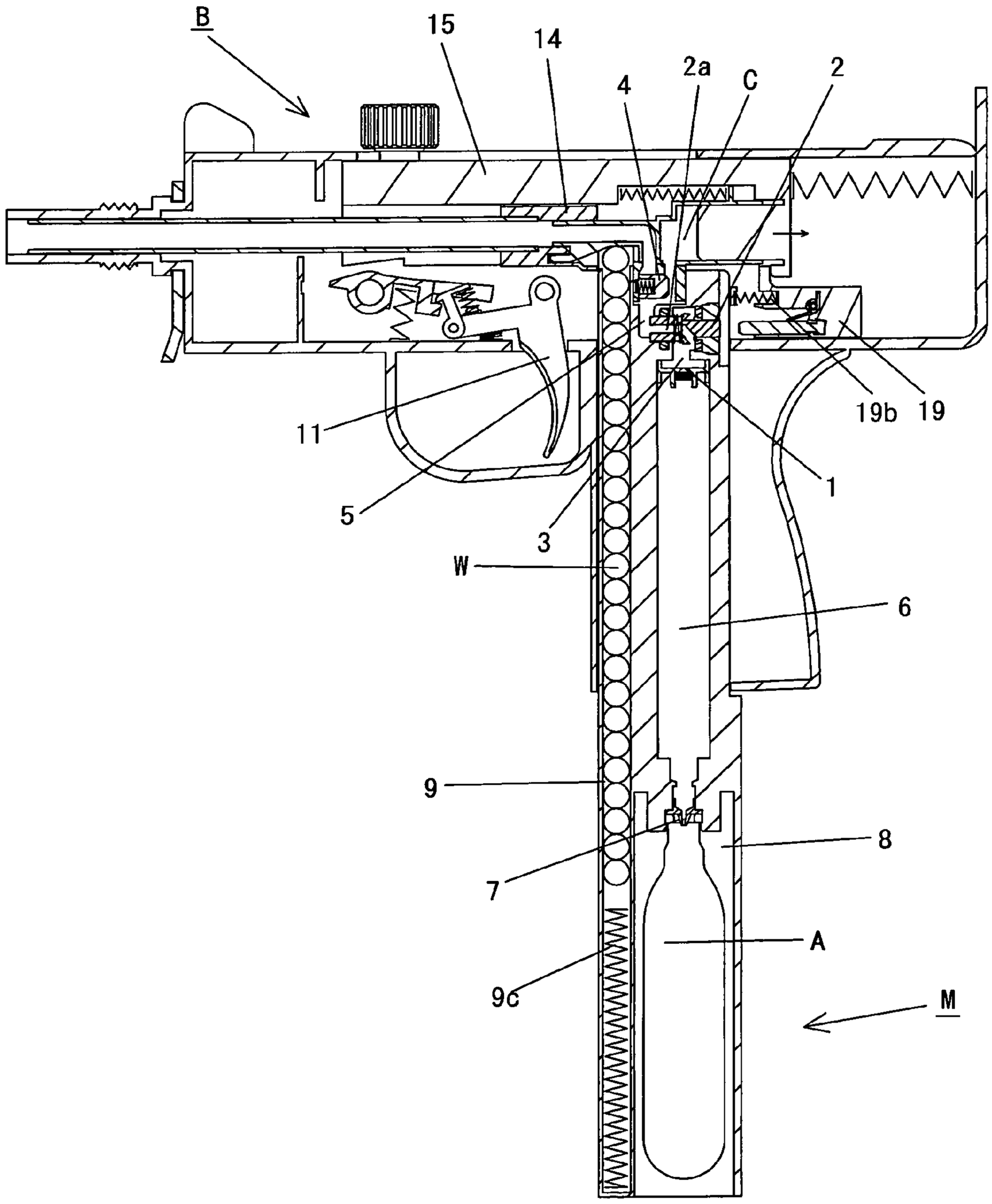

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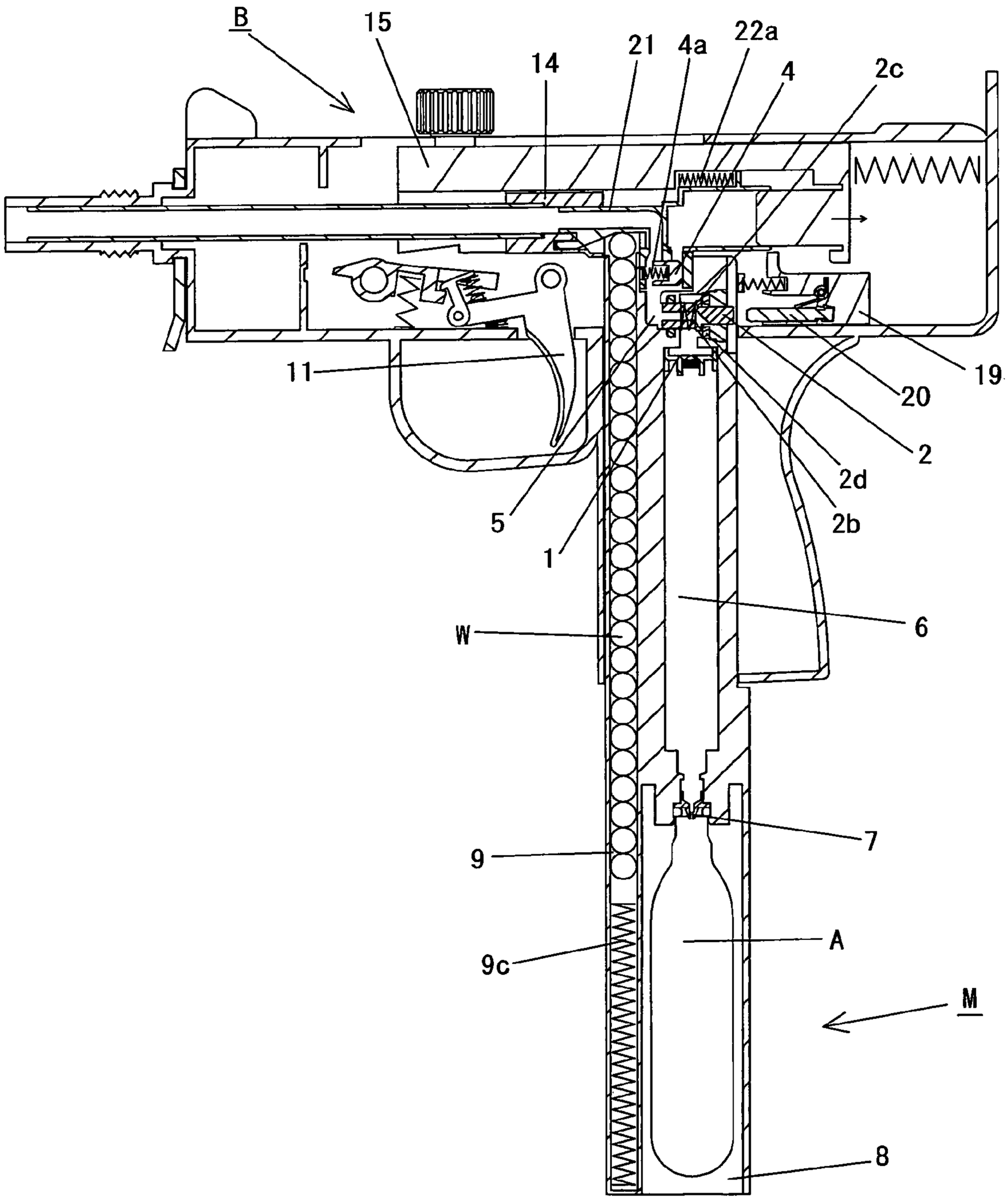


Fig. 11

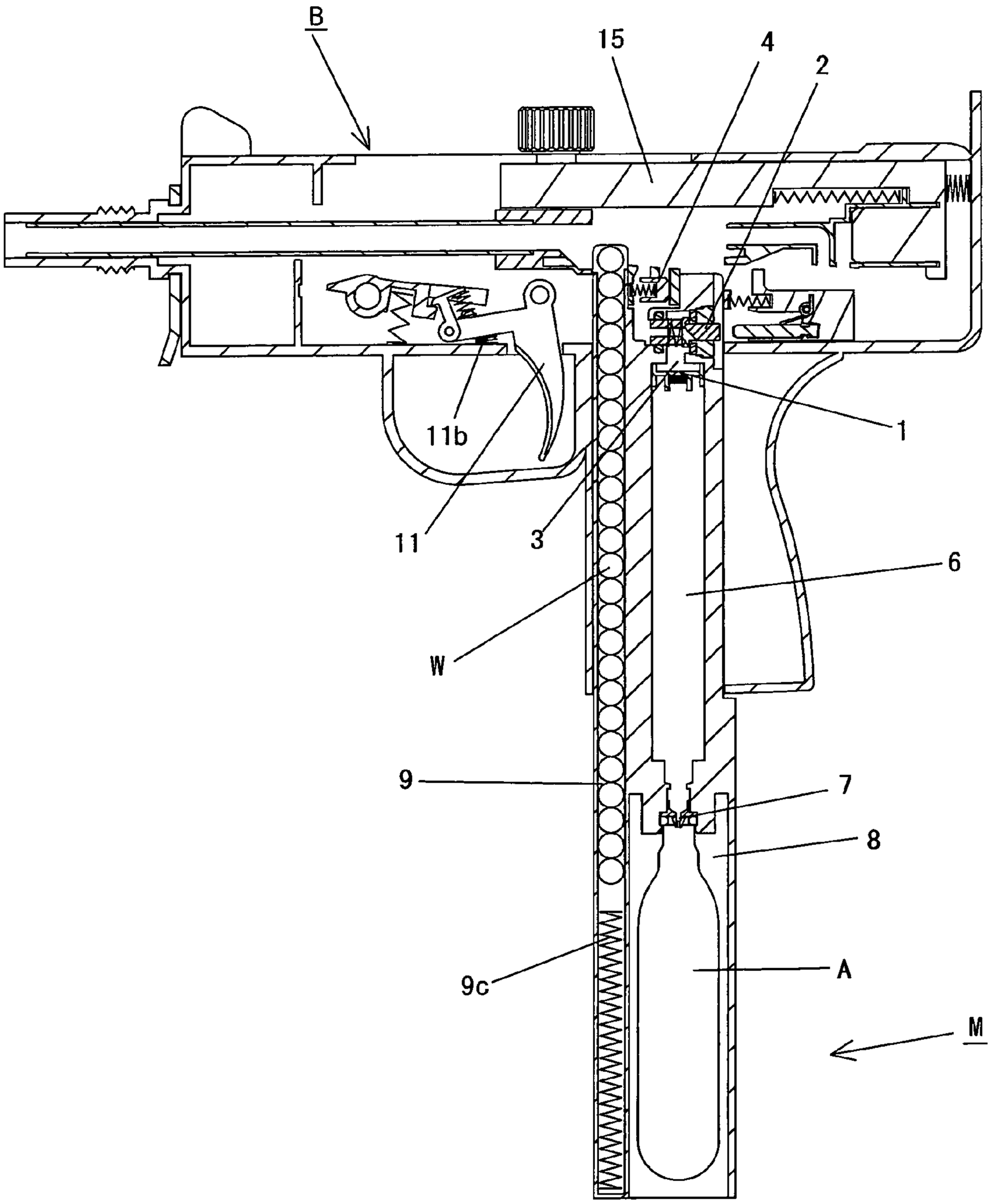
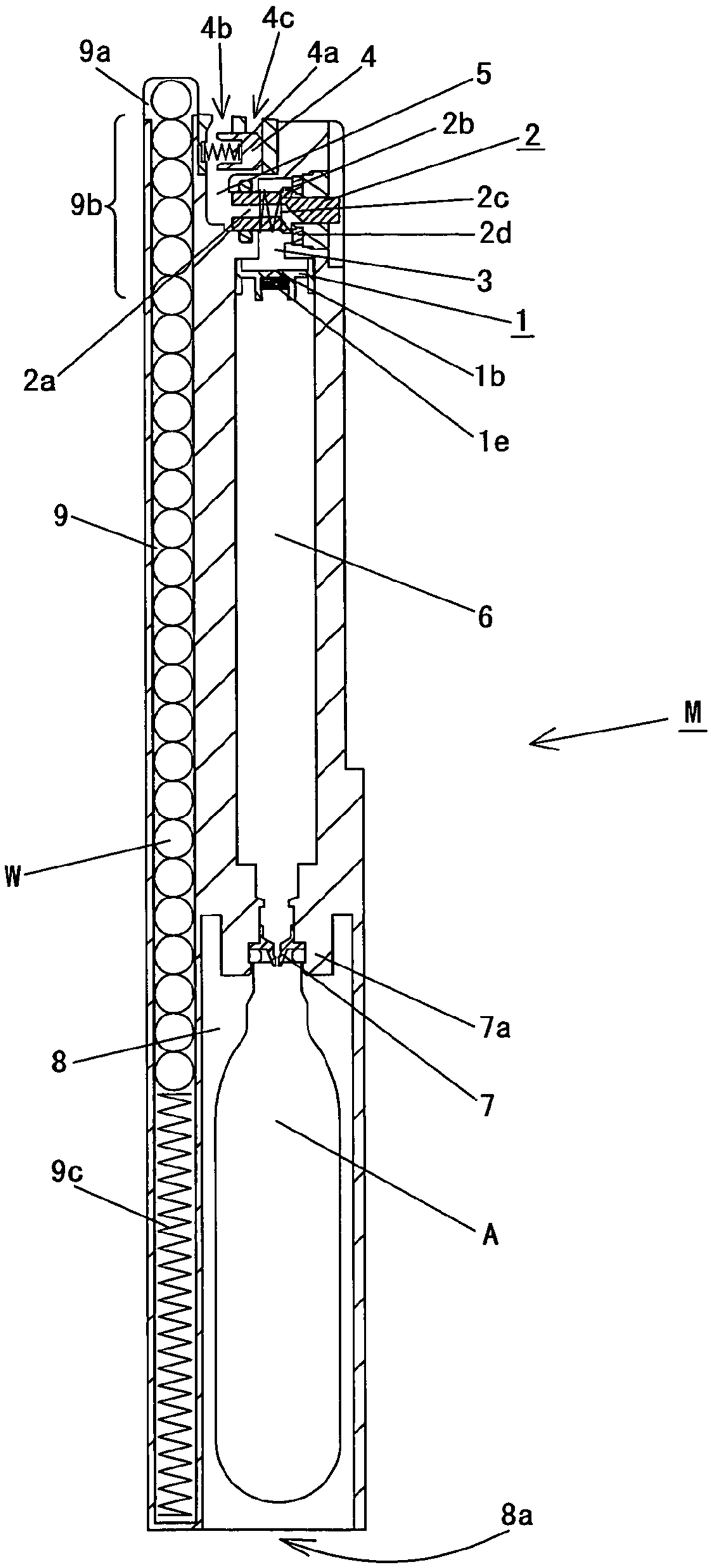


Fig. 12



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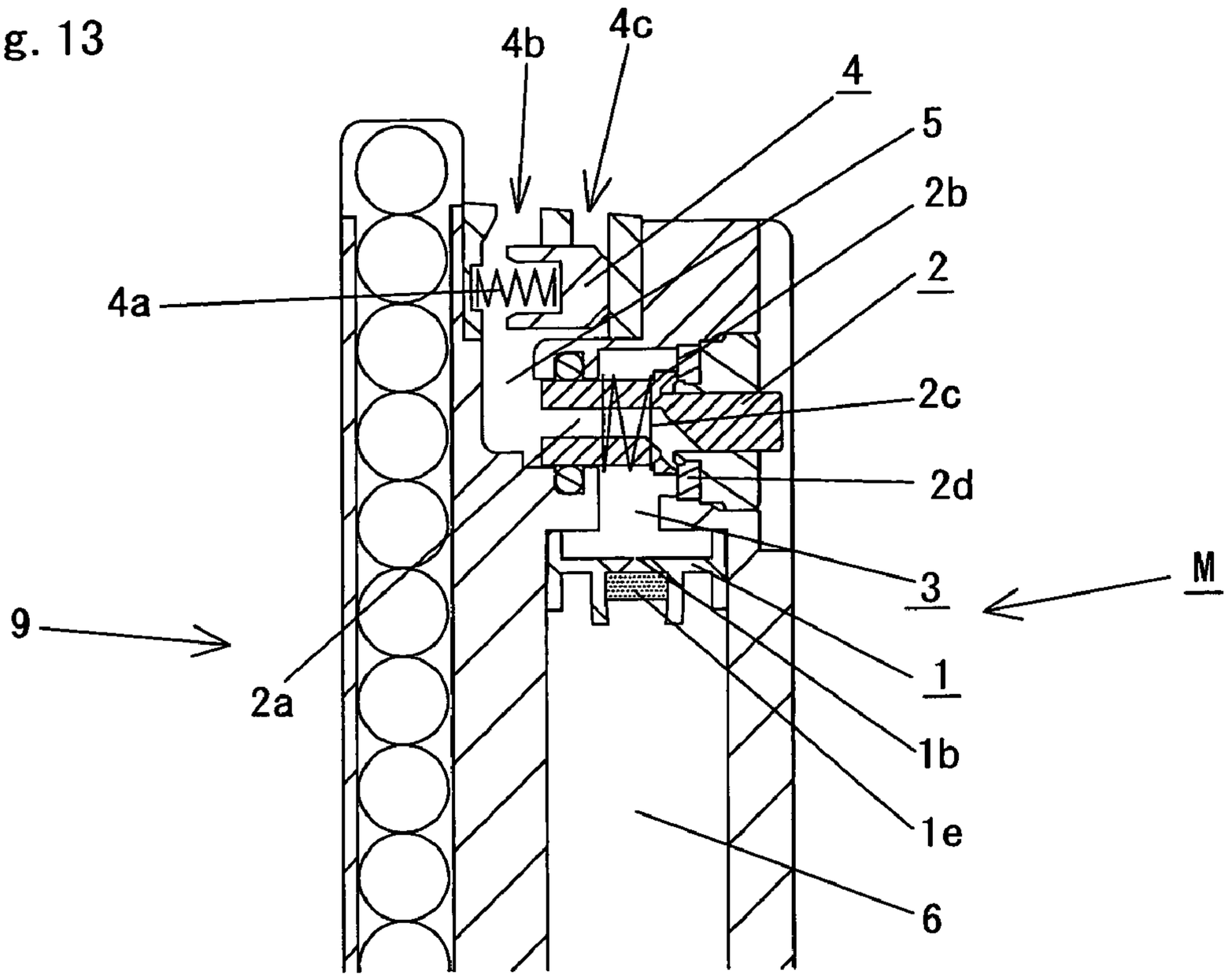
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4c
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1b
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Fig. 14

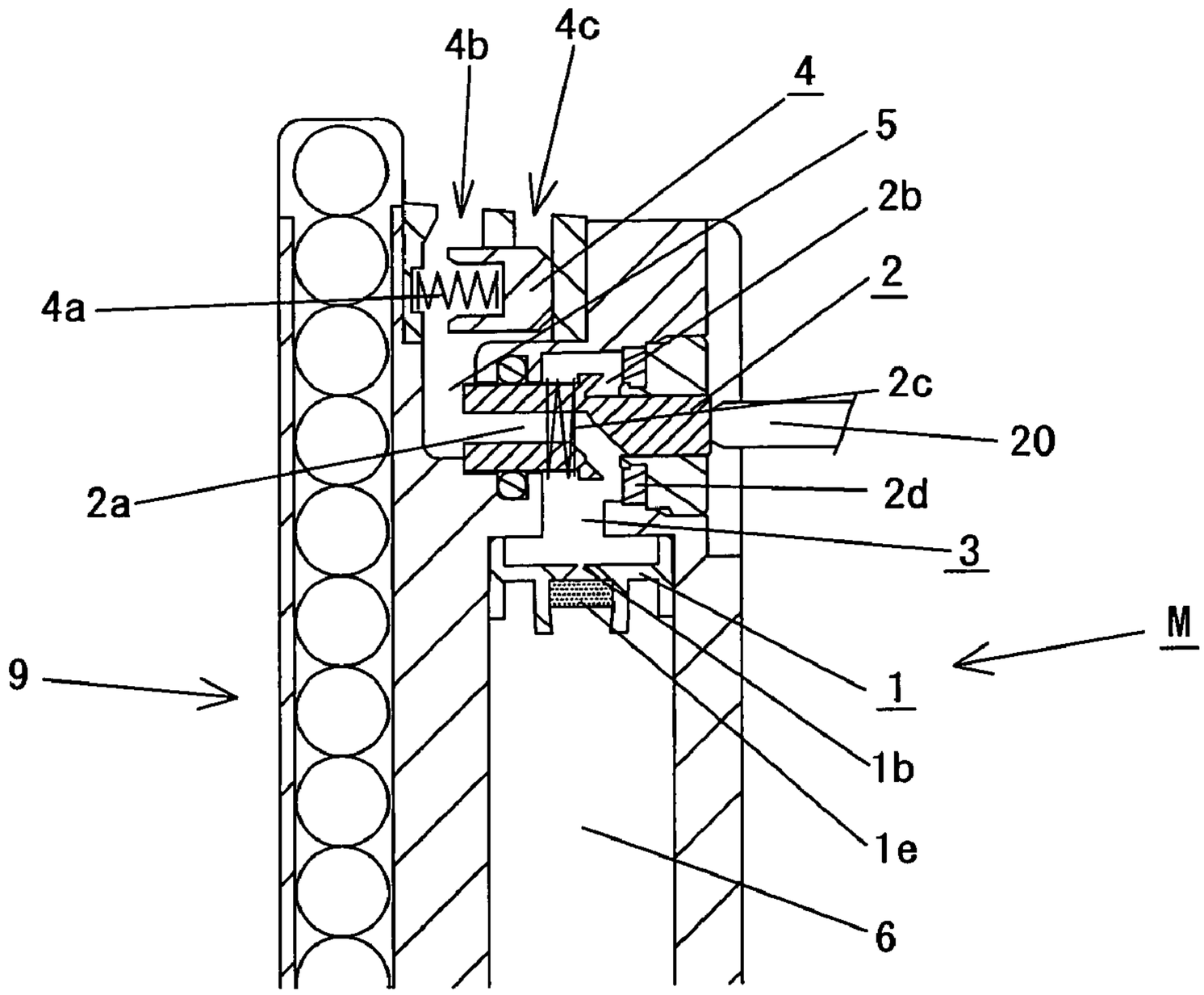
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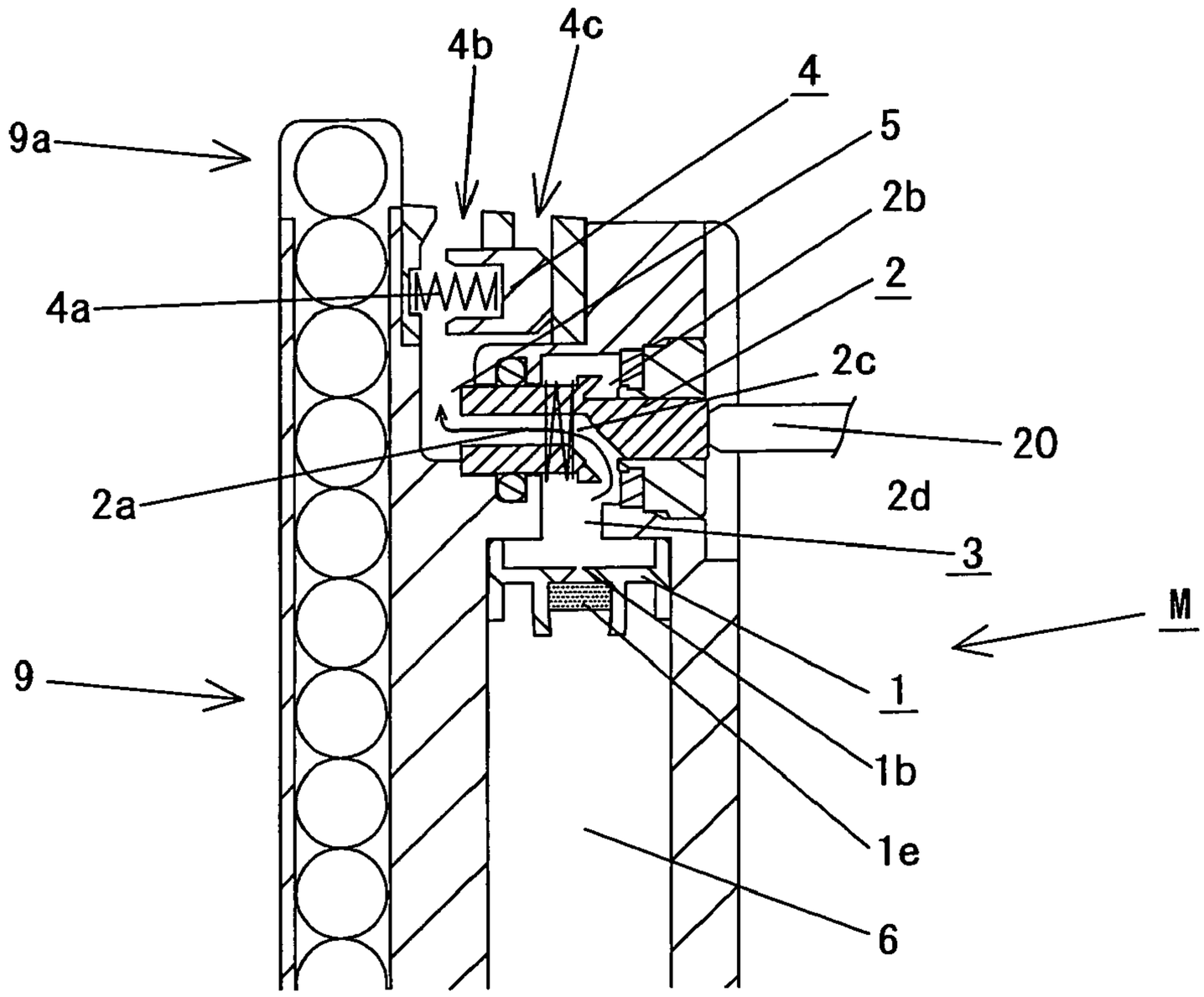
Fig. 15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4c
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Fig. 16

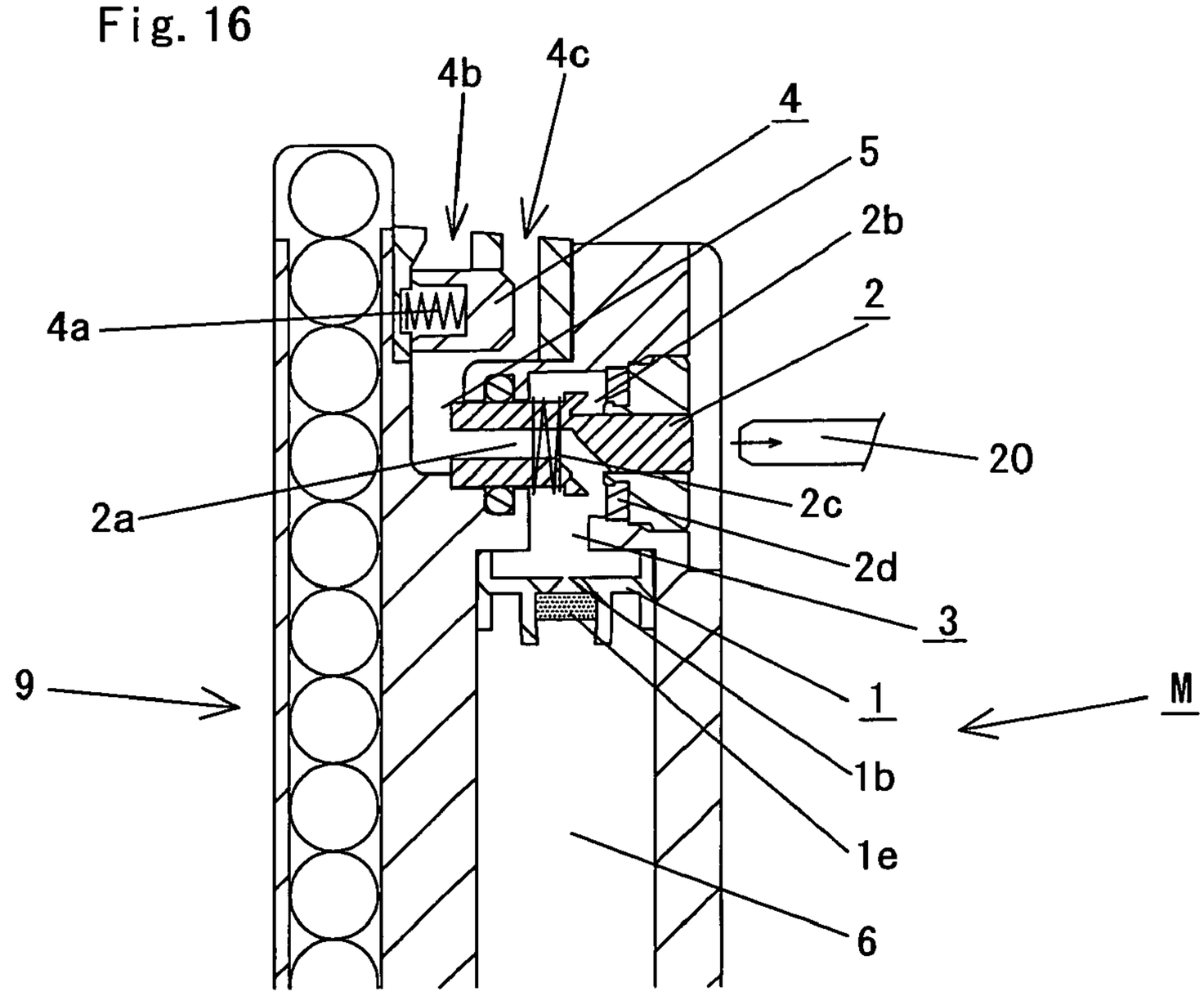
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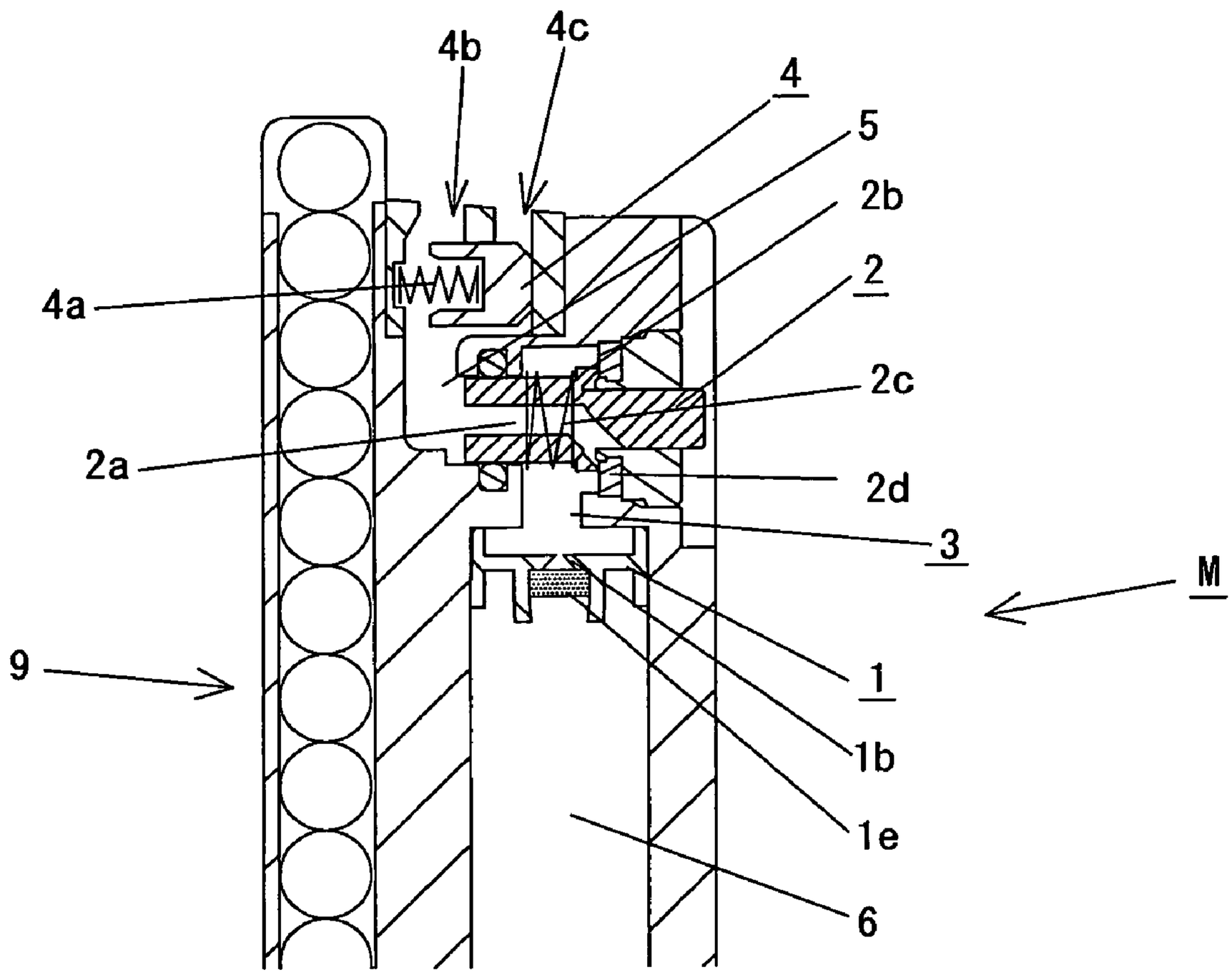
Fig. 17



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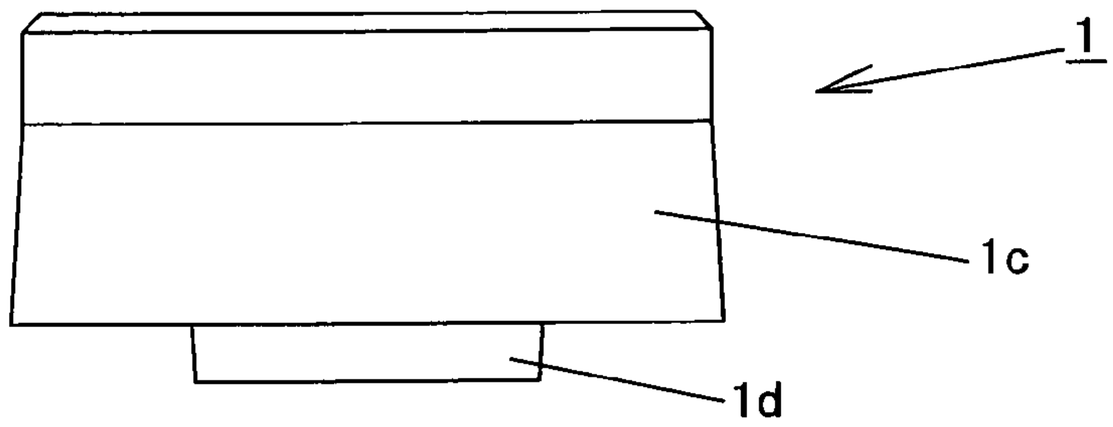

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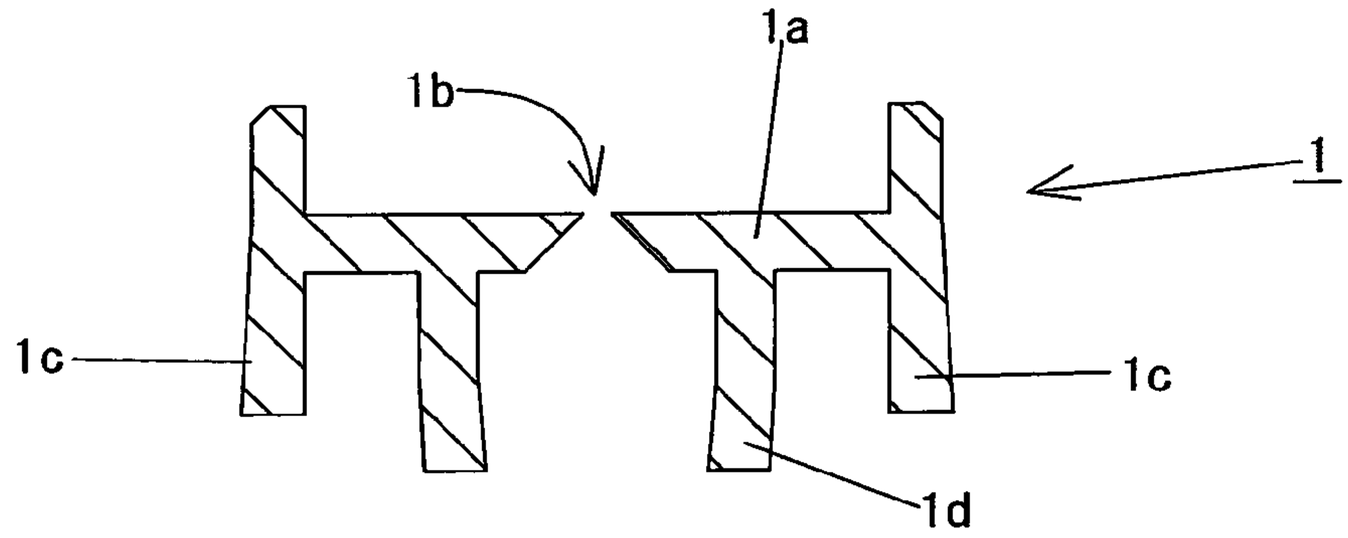
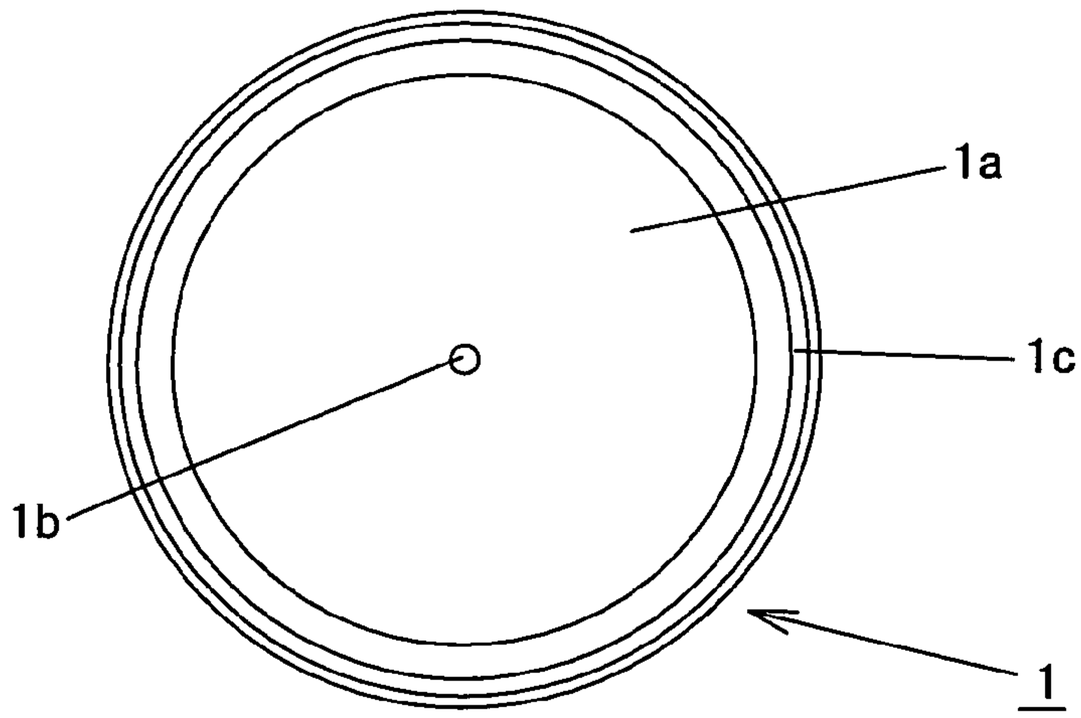


Fig. 20



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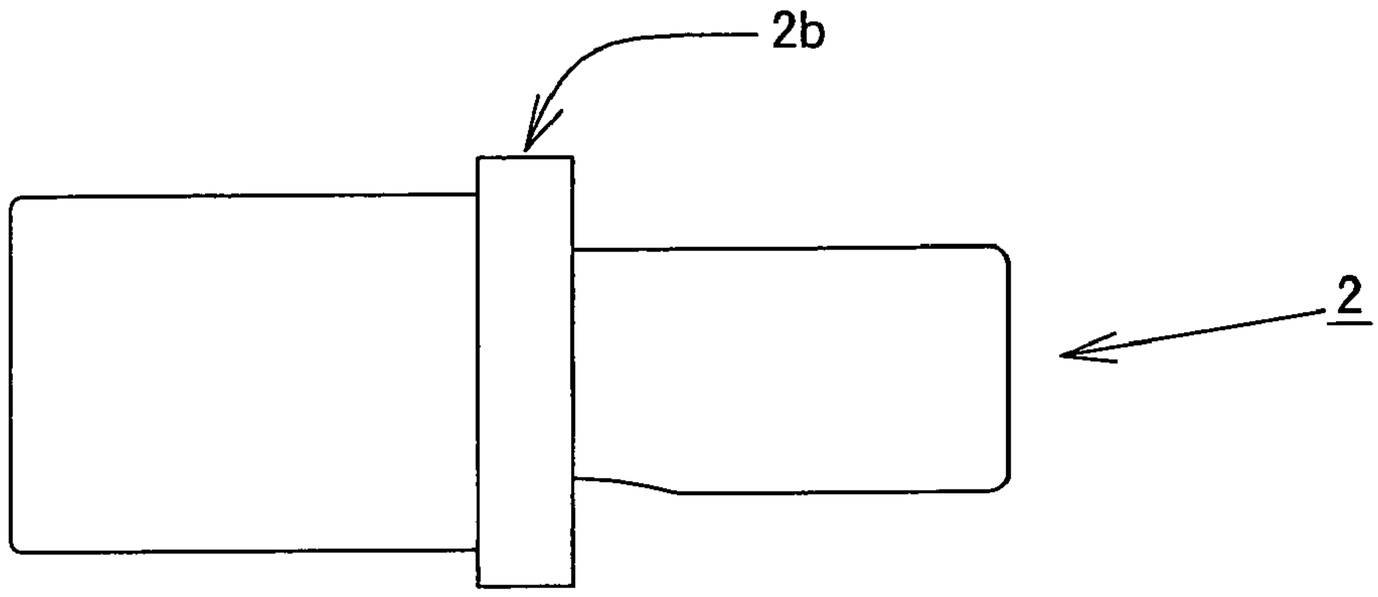

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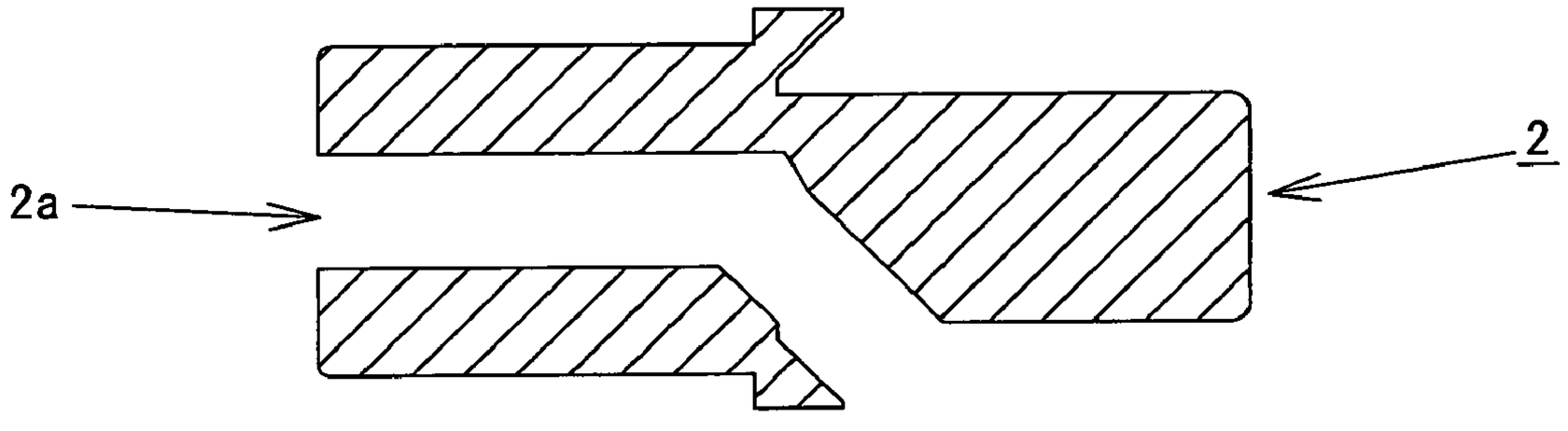

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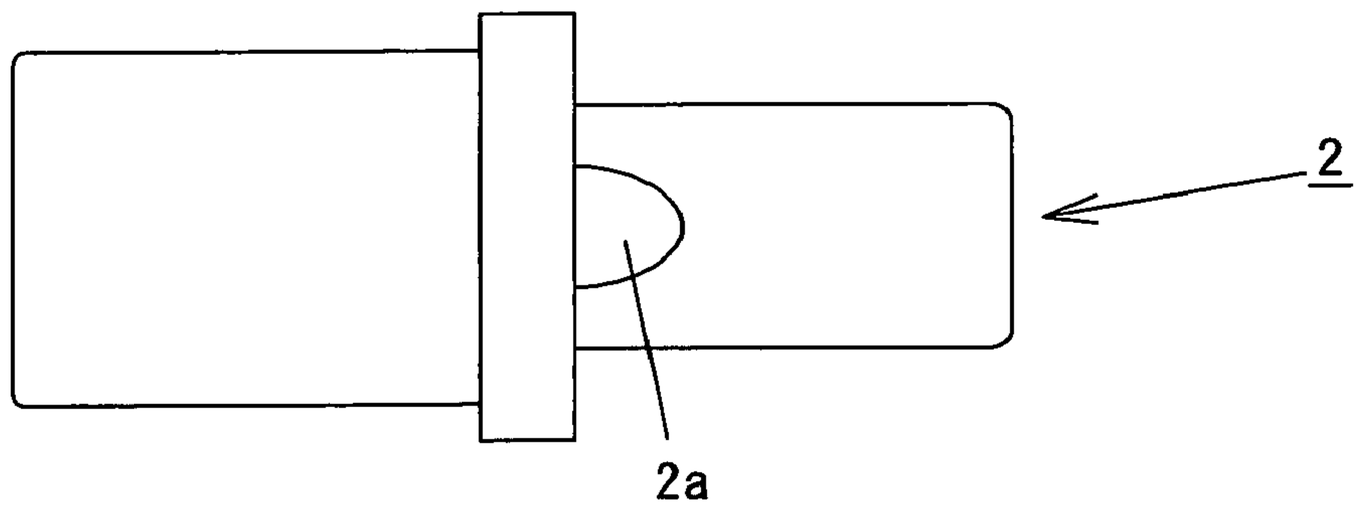


Fig. 24

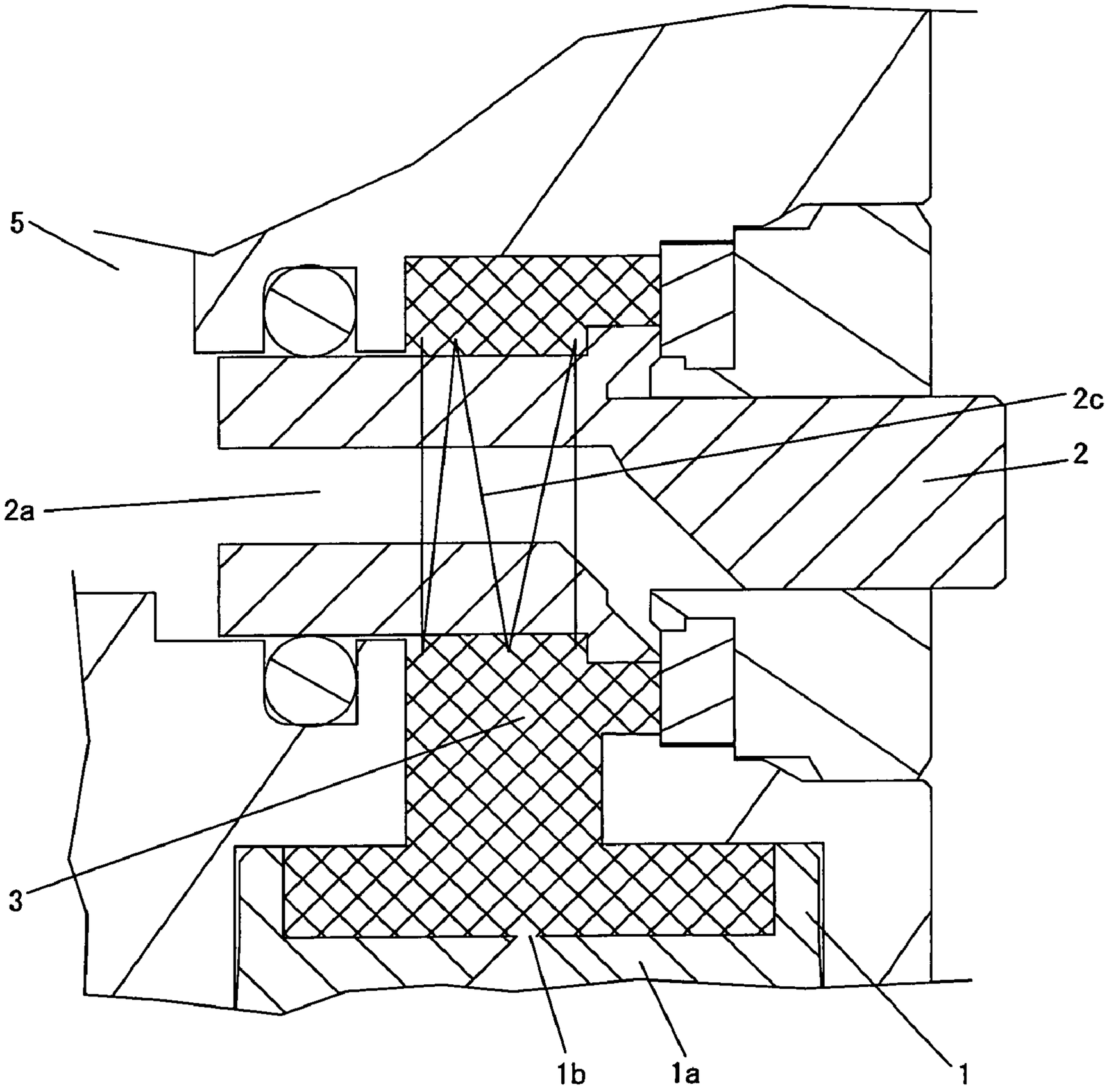


Fig. 25

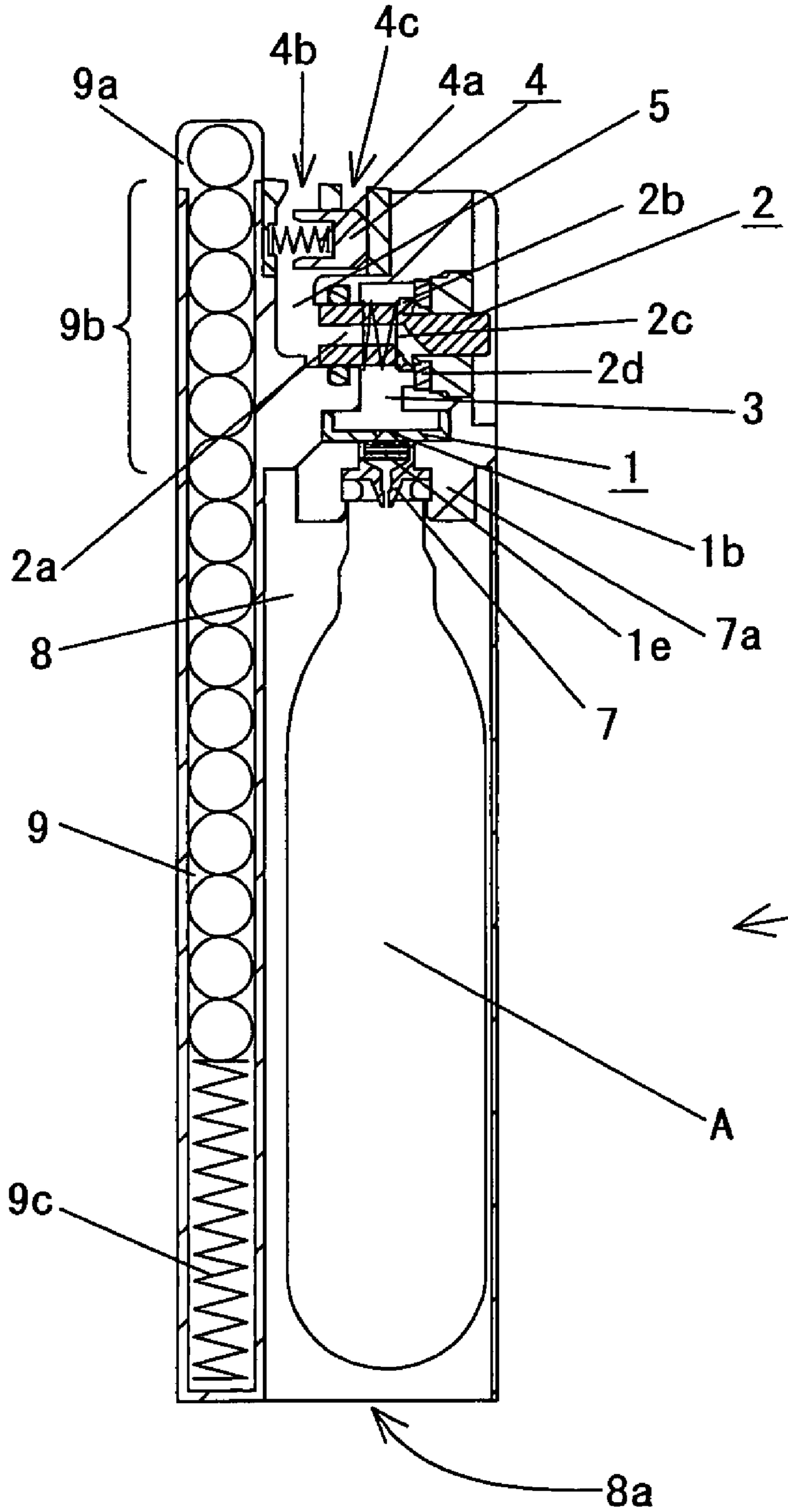


Fig. 26

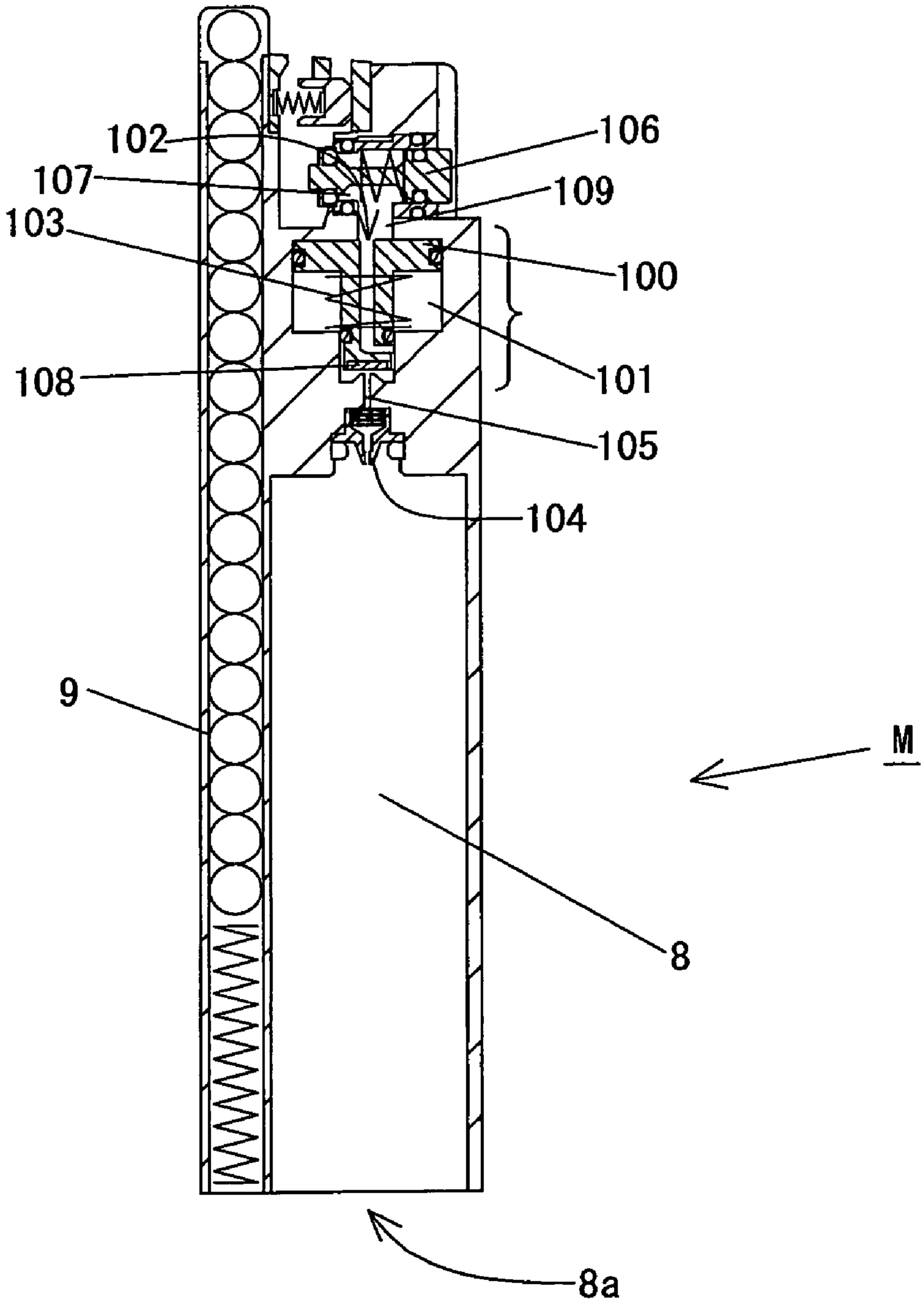
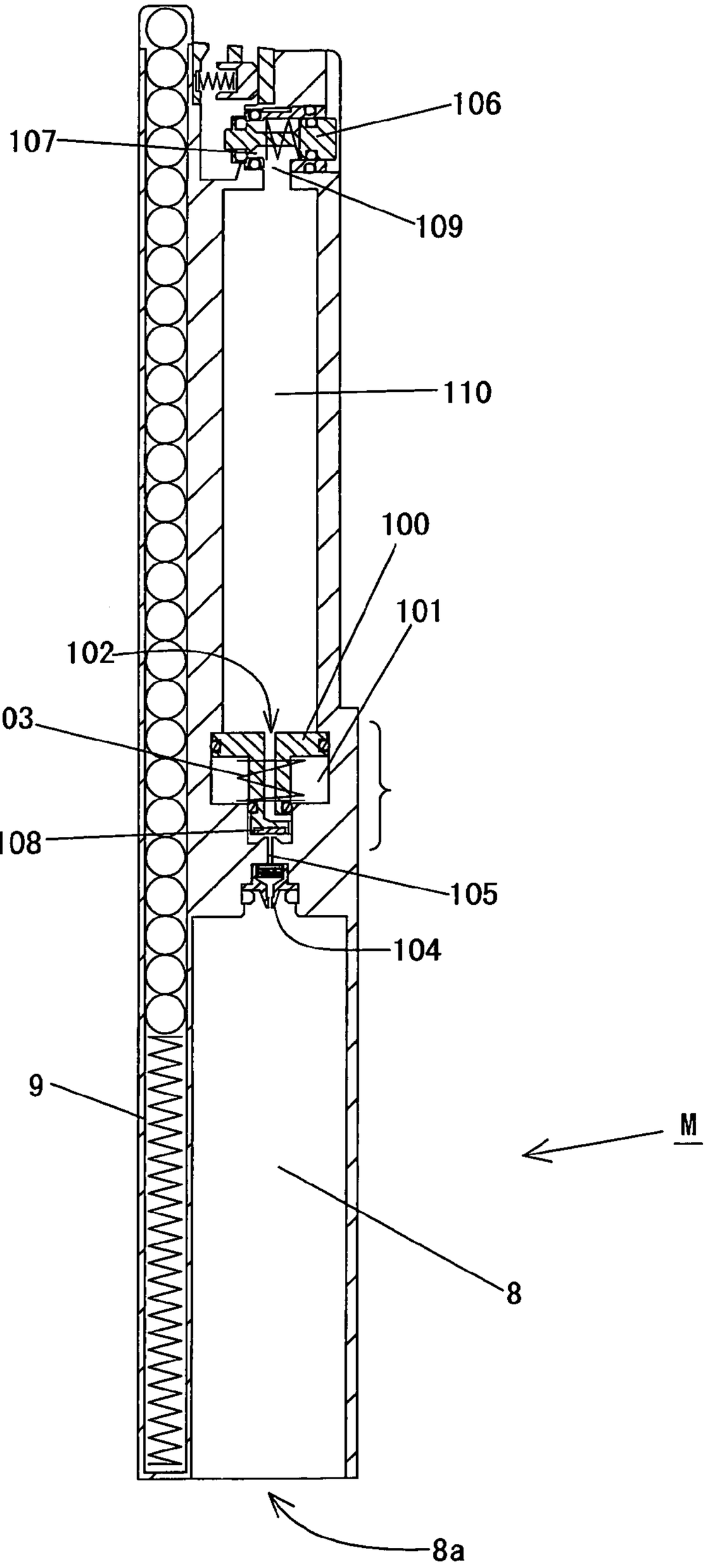


Fig. 27



AIR GUN AND MAGAZINE FOR AIR GUN

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to an air gun for firing bullets with compressed air as an energy source, and also relates to an air gun for performing firing and blowback, and to a magazine for an air gun capable of being fitted into such air guns.

2. Description of the Related Art

An air gun for firing bullets using compressed air, and an air gun for carrying out both firing of bullets and blowback are known. A magazine capable of being fitted into these air guns is also known.

A normal air gun is generally constructed to fire bullets utilizing ejection pressure of a gas canister fitted to a magazine. Gas that has been discharged from a gas canister passes through a discharge valve chamber, which is a space formed between a discharge valve and piercing assembly, due to the pressure of the gas, and a bullet positioned in a chamber is fired by opening the discharge valve (refer to related art 1, FIG. **26**).

Since the gas pressure discharged from the gas canister is high pressure (about 70 atmospheres), there is a problem in that if that pressure is used directly the bullet speed would be too fast. Therefore, by attaching a regulator or the like, which is a decompression device, between a piercing assembly for attaching the gas canister and the discharge valve, the gas pressure discharged from the gas canister is reduced, and the bullet speed is controlled to within a constant speed.

It is also known that with an air gun that uses a magazine with a lot of loaded bullets, the magazine is longer, and a vaporization chamber is provided inside a grip in accordance with this length (refer to related art 2, FIG. **27**). In the case of related art 2 also, a decompression device such as a regulator or the like is attached directly above a piercing assembly, between a piercing assembly for attachment of the gas canister and the discharge valve.

A regulator for decompressing gas pressure from the gas canister is provided with a piston cylinder **101**, as shown in related art 1 (FIG. **26**) and related art 2 (FIG. **27**), with a piston **100**, that is provided with a piston spring **103** at an outer side and is internally provided with a gas discharge path **102**, being capable of reciprocating inside this piston cylinder **101**. The piston spring **103** constantly urges the piston upwards, so as to open a through passage **105** from the piercing assembly **104**.

In a state with the discharge path **107** of a discharge valve closed, discharge gas from the gas canister fills up the discharge valve chamber **109** and the vaporizing chamber **110** to become a fixed high pressure, and the piston **100** is moved downwards inside the piston cylinder **101** against the urging force of the piston spring **103**. Discharge gas from the gas canister is stopped as a result of a through passage closing plate **108** closing off the through passage **105** as a result of this movement, and gas pressure of the discharge valve chamber and the vaporizing chamber does not rise any further and is held at a constant pressure that is decompressed.

This decompressed gas pressure moves the discharge valve as a result of a hit pin being subjected to a trigger action, to open the gas discharge path of the discharge valve and perform firing.

In the use of current air guns, in the case where a gas canister that is for sale generally is used, when the speed of a bullet is dropped to within a speed regulated by law, it is necessary to feed gas that has been decompressed by the regulator as described above to the chamber.

However, the regulator, that is the decompression device, is constructed of a combination of various precision members such as the piston cylinder **101**, which is a hollow cylinder, and the piston **100**, that is provided with the piston spring **103** on an outer side and is provided with gas discharge path **102** inside, inside the piston cylinder, as shown in FIG. **26** and FIG. **27**, and it is also necessary to adjust the urging force of the piston spring that is subjected to pressure from the vaporization chamber and the discharge valve chamber.

There is therefore a problem in that costs are incurred, such as processing time and procurement of components in order to provide the regulator.

SUMMARY OF THE INVENTION

In order to solve the above-described problems, there is proposed an air gun for firing bullets using compressed gas, having a piercing assembly capable of fitting a gas canister, being a compressed gas source, and a discharge valve capable of either discharging compressed gas from the gas canister to a chamber or stopping discharge of compressed gas to the chamber, wherein

the discharge valve has a gas discharge path, with a discharge valve chamber formed between a partition wall, closing off the gas discharge path due to urging force of a discharge valve spring, and the discharge valve, and discharge of compressed gas is possible from the gas discharge path by opening the gas discharge path using pressing force due to a hit pin, and

a partition wall having a microscopic hole section is provided between the piercing assembly and the discharge valve, and a gas volume per unit time that flows from the microscopic holes section of the partition wall into the discharge valve chamber is lower than a gas volume per unit time that flows out from the discharge valve chamber as a result of opening the gas discharge path of the discharge valve.

There is also proposed an air gun for firing bullets using compressed gas, having a piercing assembly capable of fitting a gas canister, being a compressed gas source, and a discharge valve capable of either discharging compressed gas from the gas canister to a chamber or stopping discharge of compressed gas to the chamber, wherein

the discharge valve has a gas discharge path, with a discharge valve chamber formed between a partition wall, closing off the gas discharge path due to urging force of a discharge valve spring, and the discharge valve, and discharge of compressed gas is possible from the gas discharge path by opening the gas discharge path using pressing force due to a hit pin, and

a partition wall having a microscopic hole section is provided between the piercing assembly and the discharge valve, and an opening area of the microscopic hole section of the partition wall is smaller than the gas discharge path opening area in a state where the gas discharge path of the discharge valve is open.

There is further proposed a magazine for an air gun capable of being fitted into an air gun for firing bullets using compressed gas, having a piercing assembly capable of fitting a gas canister, being a compressed gas source, and a discharge valve capable of either discharging compressed gas from the gas canister to a chamber or stopping discharge of compressed gas to the chamber, wherein

the discharge valve has a gas discharge path, with a discharge valve chamber formed between a partition wall, closing off the gas discharge path due to urging force of a discharge valve spring, and the discharge valve, and discharge of

compressed gas is possible from the gas discharge path by opening the gas discharge path using pressing force due to a hit pin, and

a partition wall having a microscopic hole section is provided between the piercing assembly and the discharge valve, and a gas volume per unit time that flows from the microscopic hole section of the partition wall into the discharge valve chamber is lower than a gas volume per unit time that flows out from the discharge valve chamber as a result of opening the gas discharge path of the discharge valve.

There is still further proposed a magazine for an air gun capable of being fitted into an air gun for firing bullets using compressed gas, having a piercing assembly capable of fitting a gas canister, being a compressed gas source, and a discharge valve capable of either discharging compressed gas from the gas canister to a chamber or stopping discharge of compressed gas to the chamber, wherein

the discharge valve has a gas discharge path, with a discharge valve chamber formed between a partition wall, closing off the gas discharge path due to urging force of a discharge valve spring, and the discharge valve, and discharge of compressed gas is possible from the gas discharge path by opening the gas discharge path using pressing force due to a hit pin, and

the partition wall has a microscopic hole section provided between the piercing assembly and the discharge valve, and an opening area of the microscopic hole sections of the partition wall is smaller than the gas discharge path opening area in a state where the gas discharge path of the discharge valve is open.

According to the present invention, by providing an extremely simple member such as a partition wall having a microscopic hole section, it is possible to reliably reduce the speed of a bullet to within a fixed speed, even a complicated decompression device such as a regulator is not provided. As a result, manufacturing time for the air gun is shortened, it is possible to lower manufacturing cost, and there is the effect of improving the manufacturing efficiency.

This is because with an air gun or a magazine for an air gun of the present invention, by having a structure where the opening area of the microscopic hole section of the partition wall is smaller that the gas discharge path opening when the gas discharge path of the discharge valve is open, the gas volume per unit time that flows into the discharge valve chamber from the gas canister side by means of the microscopic holes section is smaller than the gas volume per unit time that flow out from the discharge valve chamber as a result of opening the gas discharge path of the discharge valve, which means that gas speed and gas pressure from the discharge valve chamber to the chamber where a bullet is positioned is lowered. The firing speed of a bullet is thus reduced.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** shows an embodiment of the present invention, and is an internal explanatory drawing for describing the overall structure of an air gun of one embodiment.

FIG. **2** shows an embodiment of the present invention, and is a cross-sectional explanatory drawing for describing an operating state of an air gun, and a magazine for an air gun, of one embodiment.

FIG. **3** is a cross sectional explanatory drawing of an air gun for describing an operating state of an air gun and a magazine for an air gun of one embodiment of the present invention.

FIG. **4** to FIG. **11** are cross sectional explanatory drawings of an air gun for describing operating states of an air gun and a magazine for an air gun of one embodiment of the present invention.

FIG. **12** is a cross sectional explanatory drawing showing the whole of a magazine for air gun that is one embodiment of the present invention.

FIGS. **13** to **17** are magnified views of essential parts showing the actions of essential parts of the magazine for the air gun of one embodiment of the present invention.

FIG. **18** is a front view of a partition wall that is one embodiment of this invention.

FIG. **19** is a front cross sectional view of the partition wall of the invention.

FIG. **20** is a plan view of the partition wall of the invention.

FIG. **21** is a front view of a discharge valve that is one embodiment of this invention.

FIG. **22** is a front cross sectional view of the discharge valve of the invention.

FIG. **23** is a bottom view of the discharge valve of the invention.

FIG. **24** is a cross-sectional explanatory drawing of a discharge valve chamber that is one embodiment of this invention.

FIG. **25** is a cross sectional explanatory drawing showing the whole of a magazine for an air gun that is not provided with a vaporization chamber, being another embodiment of this invention.

FIG. **26** is a cross sectional explanatory drawings of a magazine for an air gun that performs decompression using a regulator, and is related art.

FIG. **27** is a cross sectional explanatory drawings of a magazine for an air gun that has a vaporization chamber and performs decompression using a regulator, and is related art.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Description will now be given based on FIG. **1** to FIG. **25** that show one embodiment of an air gun and a magazine for an air gun of this invention. The air gun shown in FIG. **1** to FIG. **24** is an air gun for firing of a bullet W using compressed air, and carrying out blowback, and has a vaporization chamber **6**. Besides an air gun of this configuration, it is also possible to utilize an air gun having a vaporization chamber **6** that fires a bullet W using compressed gas but does not perform blowback, an air gun that does not have a vaporization chamber **6** and carries out blowback together with firing of a bullet W using compressed gas (FIG. **25**), and an air gun that does not have a vaporization chamber **6** and fires a bullet W but does not carry out blowback.

In FIG. **1** to FIG. **25**, as an embodiment of this invention, description will be given for an air gun constructed with a partition wall **1** and a discharge valve **2** etc. are provided in a magazine M, and with the magazine M capable of being fitted into an air gun body B. Description of the air gun of the drawings of the embodiment of the invention is given using an air gun provided with a fully automatic mechanism, but the same is also true for an air gun that has a semi-automatic mechanism using a sear structure. Also, as another embodiment of the invention the description is also similar for an air gun having a structure provided with a partition wall **1** and discharge valve **2** etc. in the air gun body B.

Initially, operation of the air gun will be described based on FIG. **1** to FIG. **11**. FIG. **1** is a cross sectional explanatory drawing showing the whole of an air gun. The air gun of the embodiment of the invention comprises an air gun body B

having parts such as a frame **10**, handle grip section **10***a*, trigger **11**, inner barrel **12**, feed slope **13**, chamber **14**, bolt **15**, bolt sear **16**, bolt engagement protrusion **17**, sear engagement section **18**, hammer **19**, hit pin **20**, nozzle **21**, nozzle cylinder **22**, and a cylinder **23**, and a magazine M capable of being fitted with a gas cylinder A from a gas cylinder insertion opening **8***a* which is a lower end opening section of the handle grip section **10***a* of the air gun body B. The magazine M has parts such as a partition wall **1**, discharge valve **2**, discharge valve chamber **3**, change valve **4**, change valve chamber **5**, vaporization chamber **6**, piercing assembly **7**, gas canister housing chamber **8** and a loading section **9**. At a point in time when the gas canister **8** has been fitted into the gas canister housing chamber **8** of the magazine M, compressed gas flows from the gas canister A through the piercing assembly **7** and vaporization chamber **6**, through the microscopic hole **1***b* in the partition wall **1** and into the discharge valve **3**.

FIG. **2** is a drawing showing the state where, from the state of FIG. **1**, the bolt handle **15***b* has been pulled fully to the rear of the air gun by hand. The bolt sear **16** is rotated upwards by the urging force of the bolt sear spring **16***a*, comes into contact with the trigger sear **11***c* and stops. A bolt **15** integral with the bolt handle **15***b* is urged towards the muzzle side of the air gun by a bolt return spring **15***a*, but the front end comes into contact with the bolt sear **16** and stops.

FIG. **3** shows a state where a user has pulled the trigger **11**. If the trigger **11** is pulled, the bolt sear **16** rotates downwards, and contact with the bolt **15** is released, and then the bolt **15** is advanced towards the air gun muzzle side by the bolt return spring **15***a*.

FIG. **4** shows a state where the under nozzle protrusion **21***a* of the nozzle **21** starts to scoop out a bullet W as a result of the bolt **15** moving to the air gun muzzle side. A bullet W is placed in the chamber **14** from a bullet feed section **9***a* that opens at the uppermost part **9***a* of the loading section **9**.

FIG. **5** shows a state where the tip of the nozzle **21** has fed the bullet W to the chamber **14**. Simultaneously, the hammer engagement protrusion **19***a* and the bolt engagement protrusion **17** make contact and are pressed to the muzzle side, thus moving the hammer **19** to the muzzle side also.

FIG. **6** shows a state where the hit pin **20** is pressed to the muzzle side by movement of the hammer **19** to the muzzle side, and the discharge valve **2** has been pressed by this movement of the hit pin **20**. The gas discharge path **2***a* is opened by the movement of the discharge valve **2** to the muzzle side.

FIG. **7** shows a state where gas pressure from the opening of the gas discharge path **2***a* of FIG. **6** is discharged from the discharge valve chamber **3** to the change valve chamber **5** through the gas discharge path **2***a* of the discharge valve **2**, and a bullet W is fired through the chamber **14** by gas pressure passing through the change valve firing side passage **4***b* of the change valve **4**.

The change valve **4** is normally urged towards the rear of the gun by the change valve spring **4***a*, so the change valve firing side passage **4***b* is open, and the change valve blowback side passage **4***c* is closed. As shown in FIG. **8**, in a state where gas passes through the change valve firing side passage **4***b* at high speed, the change valve firing side passage **4***b* becomes negative pressure, and as a result of that the change valve **4** moves to the muzzle side against the urging force of the change valve spring **4***a*, to close the change valve firing side passage **4***b* and open the change valve blowback side passage **4***c*. The bolt **15** starts to retract to the rear due to the gas pressure that has passed through the change valve blowback side passage **4***c*.

FIG. **9** shows a state where the hammer return spring **19***b* acts due to retraction of the bolt **15** to move the hammer **19** back. Due to retraction of the hammer **19**, the hit pin **20** that was pressed to the muzzle side also retracts. The nozzle cylinder **22** is still stopped, and gas continues to enter the hollow C.

FIG. **10** shows a state where the discharge valve **2** is moved backwards by the urging force of the discharge valve spring **2***c*, due to retraction of the hit pin **20**, to close off the gas discharge path **2***a*. Because of the closing of the gas discharge path **2***a*, gas is no longer supplied to the change valve chamber **5**, which means that the change valve **4** is urged by the change valve spring **4***a* to the rear of the air gun, the change valve firing side passage **4***b* opens, and the change valve blowback side passage **4***c* is closed. In FIG. **10**, the bolt **15** continues to retract strongly.

FIG. **11** shows a state where the bolt **15** has retracted to the rearmost section where movement is possible. If the user releases the trigger **11** in this state, the trigger is returned to the position shown in FIG. **2** by the trigger spring **11***b*. If the user pulls the trigger **11** in this state, the states of FIG. **3** to FIG. **11** are sequentially repeated until there is no longer any gas in the gas canister A (full auto).

Next, description of the magazine M of the air gun of one embodiment of the invention will be described based on FIG. **12** which is a cross sectional explanatory drawing showing the whole of the magazine M, FIG. **13** to FIG. **17** which are enlarged cross sectional explanatory drawings of essential parts showing operation of essential parts, FIG. **18** to FIG. **20** which showing a partition wall, FIG. **21** to FIG. **23** showing a discharge valve, and FIG. **24** showing a discharge valve chamber.

The magazine M has a loading section **9**, capable of being loaded with bullets W and provided with a magazine spring **9***c* at a lower part and a bullet feed opening **9***a* at an upper part, a gas canister housing section **8** capable of holding a gas canister A, a piercing assembly **7** meshing with a gas exhaust nozzle of the gas canister A, a puncture section **7***a* at a peripheral part of the piercing assembly **7**, a vaporization chamber **6**, a partition wall **1** having a microscopic hole **1***b*, a filter **1***e* provided on a filter mounting section **1***d* so as to cover the microscopic hole **1***b*, a discharge valve **2** having a gas discharge path **2***a*, a discharge valve chamber **3**, a change valve **4** and a change valve chamber **5**.

The partition wall **1** has a microscopic hole **1***b* formed in the center of a circular plate **1***a*, as shown in FIG. **18** to FIG. **20**, and is provided between the piercing assembly **7** and the discharge valve **2**. The partition wall **1** is provided fitting into an inner wall of the vaporization chamber **6** using the peripheral wall **1***c* formed at the periphery of the circular plate **1***a* provided at an upper end section of the vaporization chamber **6**. **1***d* is a filter mounting part, and is provided with a filter **1***e*, but it is also possible to not provide the filter **1***e*. The microscopic hole **1***b* of the partition wall **1** is formed having an opening area that is wide at the volatilization chamber **6** side, which is upstream of the gas, and narrow at the discharge chamber **3** side, and is an inverted cone shape, for example, and with this embodiment the narrow surface area of the discharge chamber **3** side is 0.2 mm^2 or less.

The discharge valve **2** is formed with a gas discharge path **2***a* passing though the inside, running longitudinally downwards from a mid point in the longitudinal direction, as shown in FIG. **21** to FIG. **23**. **2***b* is a valve large diameter section,

FIG. **24** shows the discharge valve chamber **3**, with a mesh pattern, in a state where the gas discharge path **2***a* of the discharge valve **2** is closed off. The discharge valve chamber **3** is a space formed between the partition wall **1**, in a state

where the discharge valve **2** is urged to the rear of the air gun by the urging force of the discharge valve spring **2***c* and the gas discharge path **2***a* is closed. In this state, the total volume of parts of the discharge valve chamber **3** shown by the mesh pattern is 580 mm^3 or less in this embodiment, but it can be 580 mm^3 or greater.

Next, description will be given based on FIG. **13** to FIG. **17**, which are enlarged cross sectional drawings of essential parts, showing operation of essential parts of this invention. FIG. **13** is a drawing corresponding to the state of the air gun that was described in FIG. **2** to FIG. **5**. In this state, the discharge valve **2** is urged to the rear of the air gun by the urging force of the discharge valve spring **2***c*, resulting in a state where the gas discharge path **2***a* is closed off. As a result, there is no flow of compressed gas.

FIG. **14** is a drawing corresponding to the state of the air gun that was described in FIG. **6**. The hit pin **20** is pressed to the muzzle side by movement of the hammer **19** to the muzzle side, and the discharge valve **2** is moved to the muzzle side by this movement of the hit pin **20**. The gas discharge path **2***a* is opened by this movement of the discharge valve **2** to the muzzle side. The open area of this gas discharge path **2***a* is larger than the open area of the microscopic hole section **1***b* of the partition wall **1** (0.2 mm^2), and in this embodiment is about 3.1 mm^2. Accordingly, with this embodiment the opening area of the gas discharge path **2***a* is about sixteen times the opening area of the microscopic hole section **1***b*. Numerical values of the opening area of the gas discharge path **2***a* and the opening area of the microscopic hole section **1***b* vary depending on conditions such as the material of respective members of the air gun, blowback strength, range of firing speeds for bullets to be fired, etc., and so the above numerical values are examples. Accordingly, it is also possible for the opening area of the gas discharge path **2***a* to be larger than the opening area of the microscopic hole section **1***b*.

FIG. **15** is a drawing corresponding to the state of the air gun that was described in FIG. **7**. Due to opening of the gas discharge path **2***a*, compressed gas flows from the gas canister A through the piercing assembly **7** and the vaporization chamber **6**, and from the microscopic hole section **1***b* of the partition wall **1** into the discharge valve chamber **3**, and is discharged from the discharge valve chamber **3** through the opened gas discharge passage **2***a* to the change valve chamber **5**. Further, compressed gas passes through the change valve firing side passage **4***b* of the change valve **4** provided in the change valve chamber **5**, and fires a bullet that is in the chamber **14**.

At this time, a volume of compressed gas per unit time that flows into the discharge valve chamber **3** from the microscopic hole section **1***b* of the partition wall **1** is smaller than the gas volume per unit time that flows out from the discharge valve chamber **3** to the change valve chamber due to the opening of the gas discharge path **2***a* of the discharge valve **2**, because the opening area of the microscopic hole section **1***b* is smaller that the opening area of the gas discharge path **2***a*. Accordingly, the gas pressure of the discharge valve chamber **5** is lower than the gas pressure of the vaporization chamber **6**.

FIG. **16** is a drawing corresponding to the state of the air gun that was described in FIG. **9**. As a result of retraction of the hammer **19**, the hit pin **20** is also retracted.

FIG. **17** is a drawing corresponding to the state of the air gun that was described in FIG. **10** and FIG. **11**.

The discharge valve **2** is moved backwards by the urging force of the discharge valve spring **2***c*, due to retraction of the hit pin **20**, to close off the gas discharge path **2***a*. Because of the closing of the gas discharge path **2***a*, gas is no longer supplied to the change valve chamber **5**, which means that the change valve **4** is urged by the change valve spring **4***a* to the rear of the air gun, the change valve firing side passage **4***b* opens, and the change valve blowback side passage **4***c* is closed.

FIG. **25** shows a magazine M of a style loaded with comparatively few bullets W in a loading section **9**, and apart from the fact that the vaporization chamber **6** is not provided has similar structure and operation as the above-described magazine M.

INDUSTRIAL APPLICABILITY

This invention is used in an air gun for performing firing of bullets using compressed gas, and in an air gun that performs firing of bullets and blowback using compressed gas, and can reduce the firing speed of a bullet with a simple structure.

What is claimed is:

1. An air gun for firing bullets using compressed gas, the air gun comprising:

a hit pin movable to and between a retracted position and a hit position, the hit pin being resiliently biased towards the retracted position;

a piercing assembly capable of fitting a gas canister, being a compressed gas source;

a discharge valve, having a gas discharge path, capable of either discharging compressed gas from the gas canister to a chamber or stopping discharge of compressed gas to the chamber; and

a partition wall provided between the piercing assembly and the discharge valve, and forming a microscopic hole section,

wherein:

the discharge valve closes off the gas discharge path due to an urging force of a discharge valve spring, so that a discharge valve chamber is formed between the partition wall and the discharge valve,

the discharge valve discharges compressed gas from the gas discharge path by opening the gas discharge path as a result of a pressing force on the discharge valve due to the hit pin moving from the retracted position to the hit position to hit the discharge valve, and

a gas volume per unit time that flows from the microscopic hole section of the partition wall into the discharge valve chamber is lower than a gas volume per unit time that flows out from the discharge valve chamber as a result of opening the gas discharge path of the discharge valve.

2. An air gun for firing bullets using compressed gas, the air gun comprising:

a hit pin movable to and between a retracted position and a hit position, the hit pin being resiliently biased towards the retracted position;

a piercing assembly capable of fitting a gas canister, being a compressed gas source;

a discharge valve, having a gas discharge path, capable of either discharging compressed gas from the gas canister to a chamber or stopping discharge of compressed gas to the chamber; and

a partition wall provided between the piercing assembly and the discharge valve, and forming a microscopic hole section,

wherein:

the discharge valve closes off the gas discharge path due to an urging force of a discharge valve spring, so that a discharge valve chamber is formed between the partition wall and the discharge valve,

the discharge valve discharges compressed gas from the gas discharge path by opening the gas discharge path as

a result of a pressing force on the discharge valve due to the hit pin moving from the retracted position to the hit position to hit the discharge valve, and

an opening area of the microscopic hole section of the partition wall is smaller than the gas discharge path opening area in a state where the gas discharge path of the discharge valve is open.

3. A magazine for an air gun and capable of being fitted into the air gun for firing bullets using compressed gas, the air gun having a hit pin movable to and between a retracted position and a hit position, the hit pin being resiliently biased towards the retracted position, the magazine comprising:

a magazine body including:

a piercing assembly capable of fitting a gas canister, being a compressed gas source;

a discharge valve, having a gas discharge path, capable of either discharging compressed gas from the gas canister to a chamber or stopping discharge of compressed gas to the chamber; and

a partition wall provided between the piercing assembly and the discharge valve, and forming a microscopic hole section,

wherein:

the discharge valve closes off the gas discharge path due to an urging force of a discharge valve spring, so that a discharge valve chamber is formed between the partition wall and the discharge valve,

the discharge valve discharges compressed gas from the gas discharge path by opening the gas discharge path as a result of a pressing force on the discharge valve due to the hit pin moving from the retracted position to the hit position to hit the discharge valve, and

a gas volume per unit time that flows from the microscopic hole section of the partition wall into the discharge valve chamber is lower than a gas volume per unit time that flows out from the discharge valve chamber as a result of opening the gas discharge path of the discharge valve.

4. A magazine for an air gun and capable of being fitted into the air gun for firing bullets using compressed gas, the air gun having a hit pin movable to and between a retracted position and a hit position, the hit pin being resiliently biased towards the retracted position, the magazine comprising:

a magazine body including:

a piercing assembly capable of fitting a gas canister, being a compressed gas source;

a discharge valve, having a gas discharge path, capable of either discharging compressed gas from the gas canister to a chamber or stopping discharge of compressed gas to the chamber; and

a partition wall provided between the piercing assembly and the discharge valve, and forming a microscopic hole section,

wherein:

the discharge valve closes off the gas discharge path due to an urging force of a discharge valve spring, so that a discharge valve chamber is formed between the partition wall and the discharge valve, and

the discharge valve discharges compressed gas from the gas discharge path by opening the gas discharge path as a result of a pressing force on the discharge valve due to the hit pin moving from the retracted position to the hit position to hit the discharge valve, and

an opening area of the microscopic hole section of the partition wall is smaller than the gas discharge path opening area in a state where the gas discharge path of the discharge valve is open.

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